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Personal Computing Today

September 1983
75p

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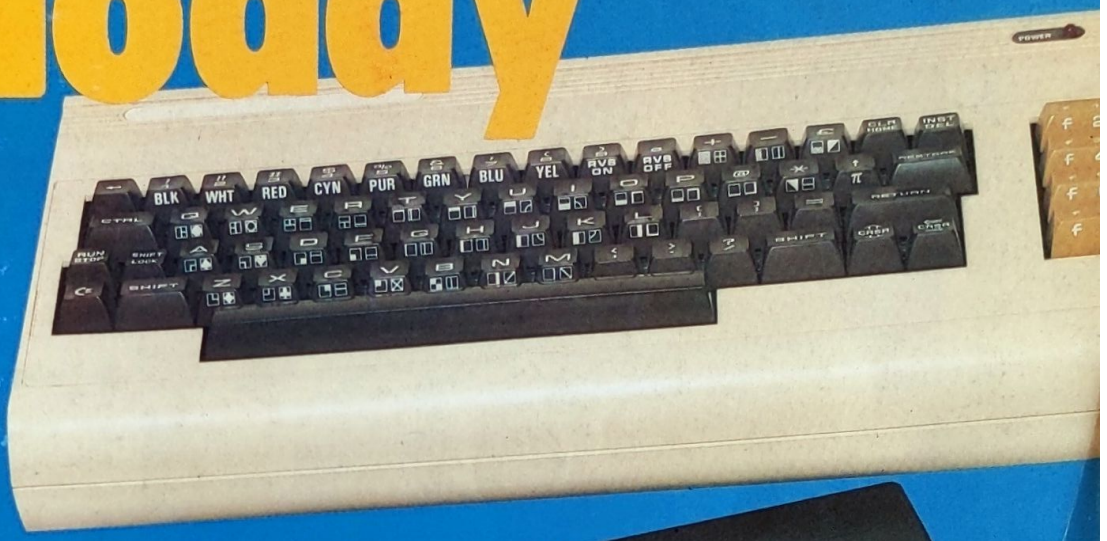
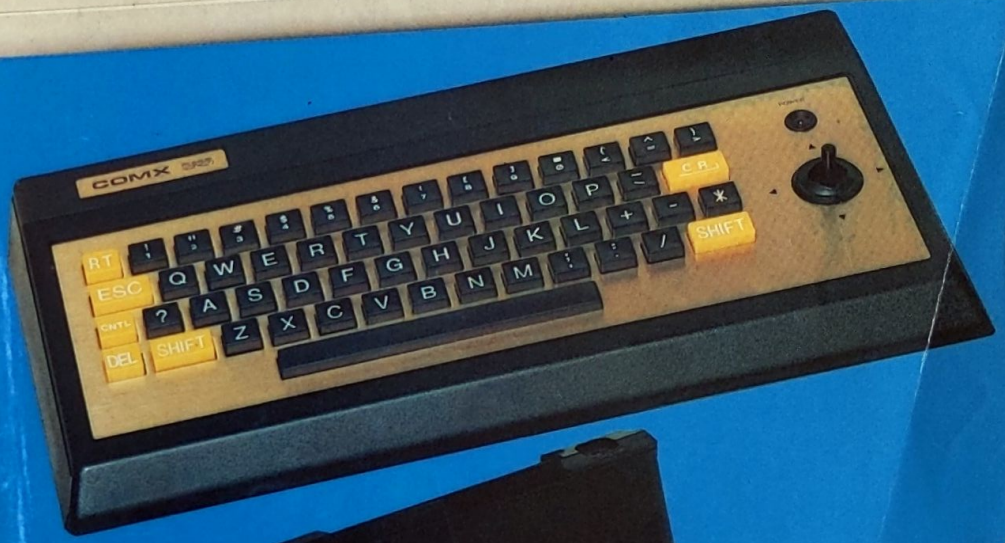
Software Checklist
Take your pick from 100s of games

Micro factfile: Hardware help for every buyer





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Personal Computing Today

VOLUME 2 NUMBER 2 SEPTEMBER 1983

Editor:
Elspeth Joiner

Editorial Assistant:
Chris Palmer

Advertisement Manager:
Beverley McNeill

Advertisement Executive:
Heather Ranson

Managing Editor:
Ron Harris

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Managing Director:
T J Connell

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ABC

Welcome to the September issue of *Personal Computing Today* although it's funny to think that this is an autumn copy of the magazine, yet at the time of writing the sun is blazing down upon us while the heat is reducing us all to pools of sweat.

I hope that the good weather hasn't put a stop to your computing exploits, temporary though it might be. There are still plenty of programs to try out on your computer and masses of super commercial software to get to grips with too. There's stacks of new software coming out all the time as well as new software firms including one called **Visions** which could prove to be an interesting one.

Now that the market is bursting at the seams with new companies producing software it has in recent months become extremely competitive. Most new firms are now launching into the field with substantial financial backing behind them. And this can only mean that the small, one-man outfits operating from sitting-rooms up and down the country will be squeezed out of business before too long.

This isn't necessarily due to lack of creative ideas for programs but lack of money muscle and marketing flair. Now firms need to hit upon original ideas for programs, games in particular, and sell them in eye-catching packages, especially now that there are about 2,000 retail outlets for software the more shelf-space your product occupies the more chance there is of people seeing it.

Without doubt the up-and-coming software firms have applied this rule and it's proved to be a successful formula. Just take a look at **Imagine Software**, **Virgin Games** and **Quicksilva's** products. They are bursting with life and professionalism, and obviously have good programs.

Visions will be interesting to watch because it was started by an ex-member of Quicksilva, Sean de Bray. He realises that the only way to survive in the home computer software industry is to provide quality and value for money. Judging from the first batch of games to emerge they have put time, thought and effort into the presentation of their products and plan to produce quality software.

This trend in marketing ploys can only be good news for the customers. It means that quality of both programs and packaging (including instructions) and service will improve as well as all-round standards generally improving.

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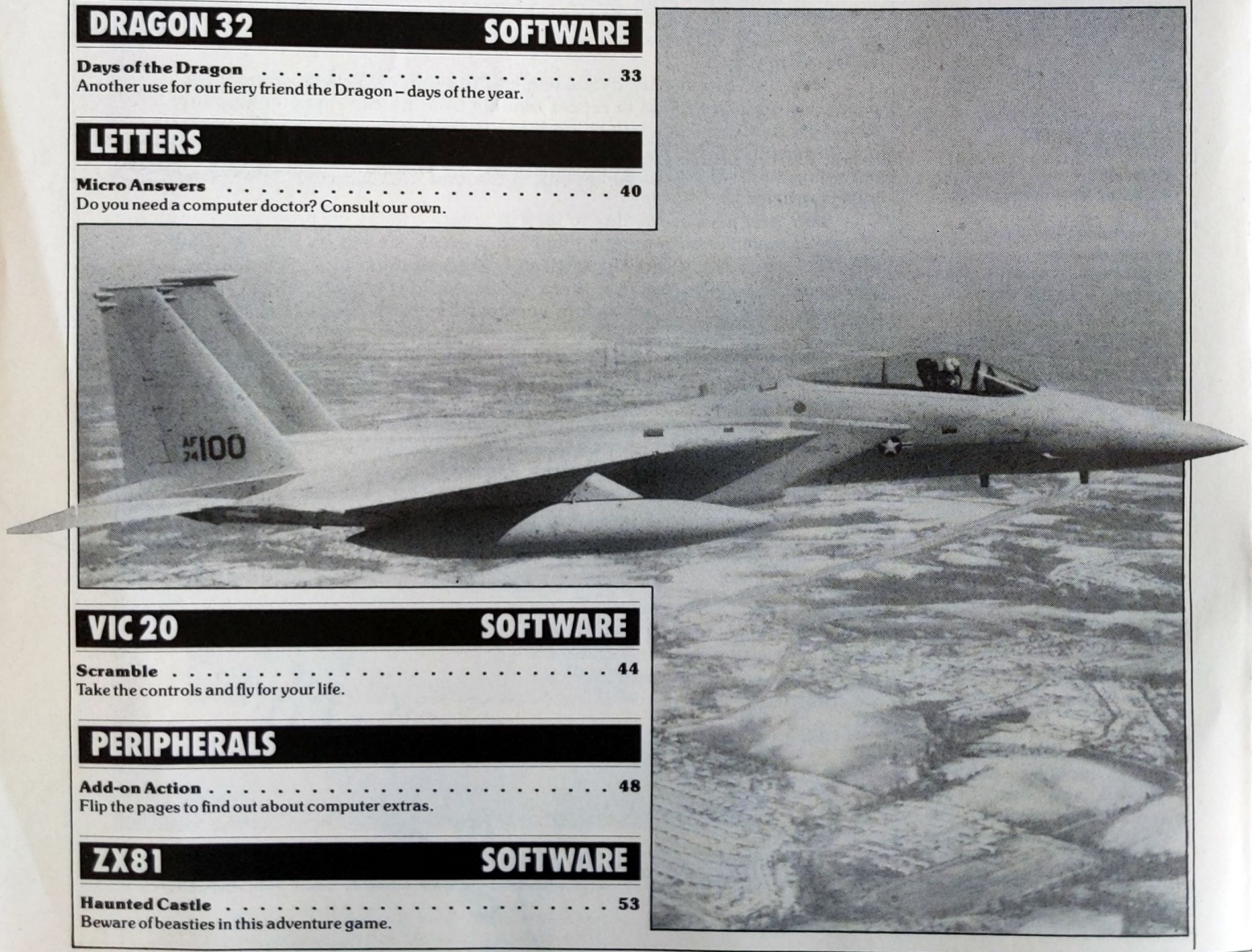

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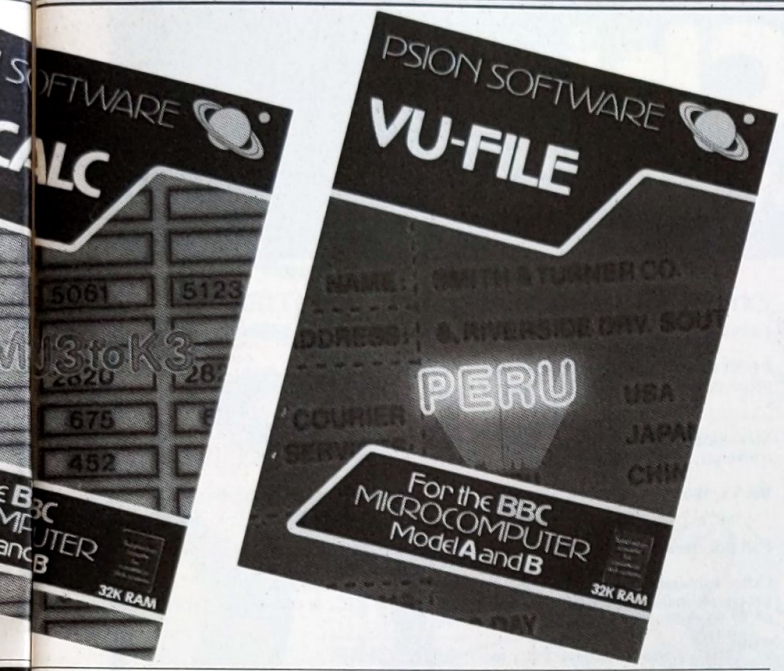

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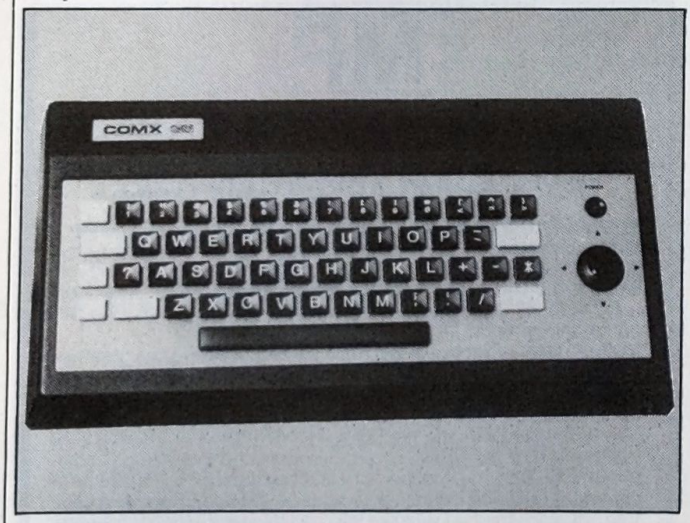

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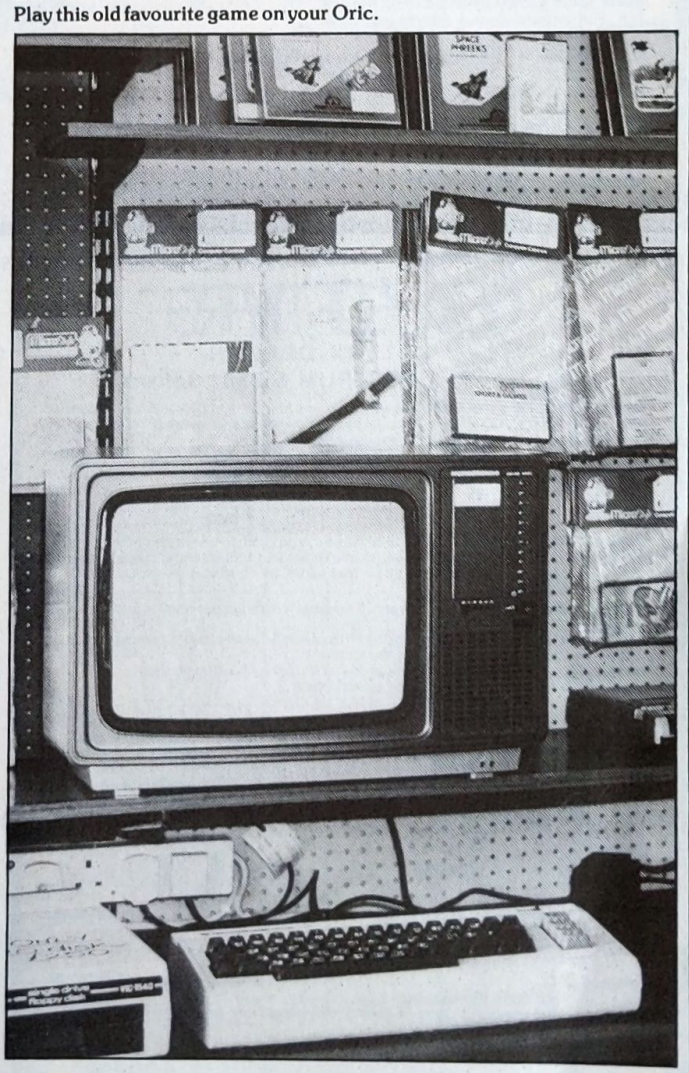

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Mr. Chip
SOFTWARE

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SULTAN'S MAZE by Christopher Hunt Enter the 3D Maze in search of the Sultan's jewels, but beware, your strength may run out, or, you may come face to face with the Mad Guardian. A multi-difficulty game with fantastic graphics and sound.
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GEMPACK IV by W. E. MacGowan Two great machine code games, with full colour graphics.
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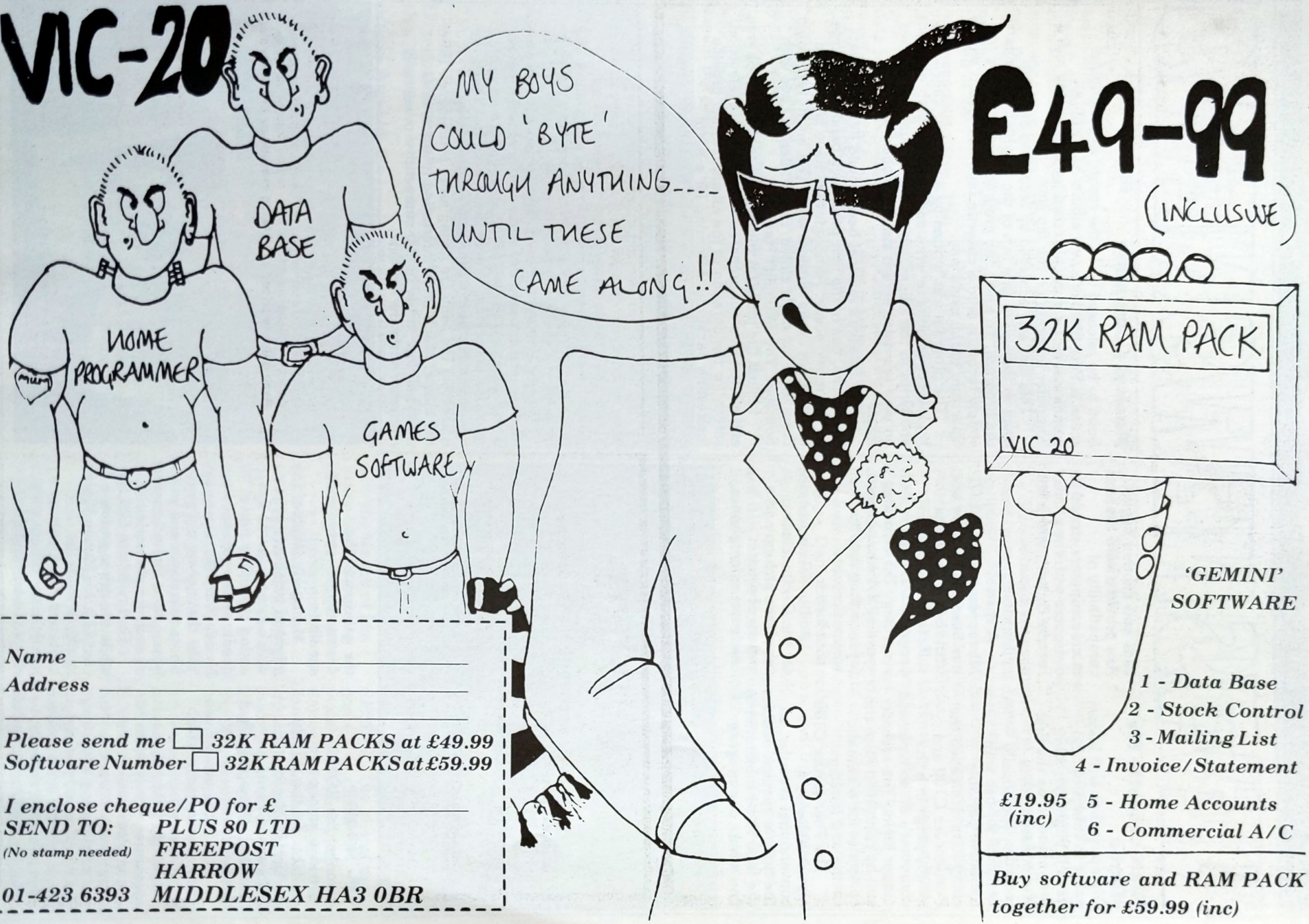
VIC-20



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NEWS NEWS NEWS

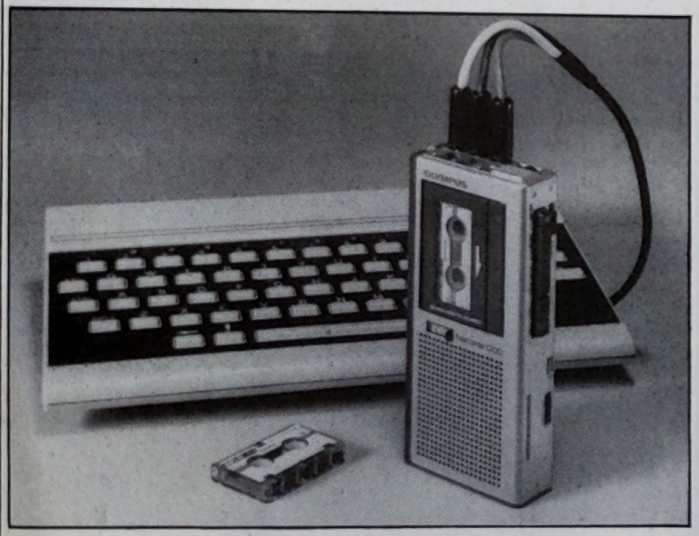
Microcassette for Micros

Olympus, that well known name in things optical, have brought out what they claim to be the first Microcassette data recorder, specifically designed for use with handheld portable computers. It's called the Pearlcorder C100 and simply plugs into the computer's audio input and output jacks. The recorder can be controlled from the computer for automatic saving and loading.

The Pearlcorder C100 also doubles as a conventional recorder, so the built in speaker enables the tape to be monitored to find where one program ends and another begins. Any problem with the compatibility of microcomputers should be overcome with the phase reverse control, which will alter the signal appropriately.

A special Microcassette, MC-15 CT has been designed for use with the C100. It has sufficient length for program and data recording. The recording speed of 2.4 cm/s is used for recording data to ensure accurate reproduction.

Additional accessories for the C100 include a telephone pick-up and a variety of electret condenser microphones.



Musical Computing

Soon to be released on to the record and computer scene is Pete Shelley's new album XL1 with a combination of a musical recording on one side and a computer program on the flip side.

This feat was achieved by recording an 'extra' track at the end of side two of the lp which contains the program. To make the program run you have to simply record it onto a cassette tape and load it onto a Spectrum in the usual way.

The program was written by an author called Joey. It took five months to write and provides both graphics and lyrics to the album, which are designed to appear on your television screen simultaneously with the music.

Pete Shelley's musical background lies with the Buzzcocks, one of the first punk rock bands to emerge on the music scene. Although they have faded from the forefront of the musical world you might remember them for a hit single called 'Ever Fallen in Love with Someone You Shouldn't Have?'

I found the program routines enjoyable to look into and while I was not prepared to stare at the television screen for the duration of the album it could provide interesting background lighting for a party.

Full marks must go to Island Records for venturing into what could be one of the most exciting music/computer developments of the future.

It's only fair to say that other record companies have dabbled with similar programming experiments. Thorn-EMI's artist Chris Sievey released a single entitled 'Camouflage' which carried a program on the reverse side to produce graphics and lyrics on screen in much the same way as Pete Shelley's project.

Virgin Games, a spin-off from Virgin Records, has also recently brought out eight new computer games with rock singer Steve Hillage giving voice on each tape. It's interesting to note that Virgin has taken the opposite track from Island and Thorn-EMI in marketing the software giving more prominence than the music. Much more interesting to see is how all three will fare in the highly competitive music and computer software markets.

VIC Games

Amongst the ROM cartridge games now available for the VIC 20 are Gorf, Cosmic Jailbreak, Cosmic Cruncher, Menagerie, and Money Wars.

Gorf is the well known video arcade game which incorporates four completely different space adventures. Each needs to be completed before the player can progress to the next challenging situation. The two Cosmic prefixed games involve acting as a jailer in a high security prison in the far reaches of the galaxy and the destruction of roving alien satellites.

Menagerie involves the plight of computer fleas which have to avoid flea-eating crocodiles and a deadly spider swamp. In Money Wars the aim is to 'take the money and run'. Shots rain down and you have only a limited number of walls for protection.

Gorf retails at £24.95 while the other games will cost £19.95. Money Wars is played from the keyboard, Gorf with a joystick, the others with either option available.

NEWS NEWS NEWS

Day of the Torch

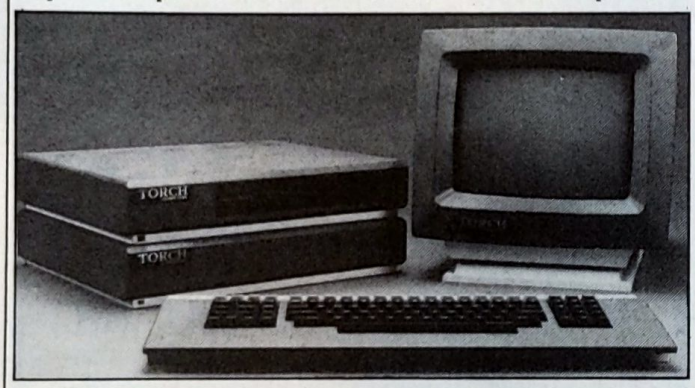
Torch Computers celebrated 4 July with the launch of two new computers and a range of software to run on both the new and the old.

The two new hardware releases are right at the top end of the microcomputer range. The 700-series uses the 68000 from Motorola — a 32 bit processor with a 16 bit data bus and is normally supplied with 256K of RAM, upgradeable to 1Mb. Those of us with micros can only dream of such processing power, but maybe someday?

Torch also brought out the 300-series workstation, which is designed to exploit the power of its sister machines at low cost as part of a Torchnet system.

Torchnet software makes use of the Acorn Econet hardware built into every Torch machine, to provide high speed error-free information transfer across the net. Econet is, of course, a feature of the upgraded BBC Micro and looks like becoming the most popular network in Britain.

Other software for the Torch machines includes packages for financial modelling, word-processing, database and graphics. A package containing some of these facilities will be given away with the Torch Z80 disc-pack upgrade for the BBC model B microcomputer.



Inner Visions

Software production has reached an unprecendented level with firms springing up left, right and centre to join the success of others.

Visions is one new software firm looking to the future for success in selling games for a variety of computers. Formed by one ex-member of Quicksilva Sean de Bray and with the financial clout of tape duplicating firm Dataclone the other directors include Martin Parmiter and Roz Evitts.

Visions staff are quick and keen to emphasise that their enterprise is a complete break-off from Quicksilva. All the programs brought out by the company will be their own ideas, none of the first batch of games were thought up by Quicksilva. Their involvement with Dataclone can only improve service because Dataclone has specially bought up new equipment to handle the extra work load so present clients will not be in jeopardy.

New games are being produced for the Spectrum and BBC computers but others are to follow shortly. Sean admits that the first batch of games to appear are not entirely original but says this doesn't detract from the software. He promises that the next load of games to come from their stable will be innovative, creative and original.

The first titles in the range are Sheer Panic and Pitman Seven, both of which run on either a 16K or 48K Spectrum. Sheer Panic is a version of the arcade type favourite Apple Panic and Pitman Seven is a game in which you have to rescue two teams of men who are trapped miles underground in a coalmine. Fun eh! Try it out and see. Keep an eye on Personal Computing Today to find out the latest news from Visions.

Dragon Across the Water

Dragon Data Ltd, the Welsh based manufacturers of the Dragon 32 microcomputer, have moved into the United States and the rest of the American continent in a joint venture with the Tano corporation of New Orleans.

Tano manufacturers and markets computer based electronic systems for industry as well as personal/business microcomputers and related products. Dragon naturally see this as a very important development since they aim to achieve worldwide distribution for their successful micro. America is the key market for home computers and Dragon are delighted that a deal has been struck within the first year of Dragon's existence.

Meanwhile back home, Microdeal have announced a new range of software for the Dragon 32. Ironically they are bringing Frogger, currently the number one game in the United States, over to Britain and onto the Dragon 32 machine.

There are five more new titles coming: Composer, Morocco Grand Prix, Cuthbert Goes Walkabout, Shuttle — a space shuttle simulator actually written by a NASA employee, and Teletutor — four educational programs. Sounds like fun.

Thornsoft

Thorn Emi Home Computer Software have burst back onto the scene with the launch of four action-packed and challenging new games.

The highly acclaimed SUBMARINE COMMANDER is now being released for the VIC 20 having originally been written for the Atari computers which took sometime to do. With its three screen graphics simulation and nine game variations it should prove popular with the novice and the most experienced Submarine Captain alike.

Also for the VIC 20 is the space game with a difference. The mission brief involves defending a planet from various armies of power-mad aliens.

For the Atari 400/800/1200, there is the fast-moving game RIVER RESCUE. The aim of the game is to captain a powerful motor launch through numerous dangers, fearsome crocodiles, rocks, enemy helicoptors and mines in an effort to rescue lost explorers trapped in treacherous jungle.

From the same machines comes the interesting sounding ORC ATTACK. In the persona of Eric the Brave, the player has to defend his castle against an onslaught of murderous Orcs. There are parts also for the Sorcerer, the dreaded Stone Warts and gigantic Demon Trolls.

HARDWARE

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ORIC AND SINCLAIR COMPUTERS

Oric 1 48K computer £147 (£158). Oric 1 16K n/a (n/a). Sinclair Spectrum 48K £113 (£133). Spectrum 16K £86.91 (£107). 32K memory upgrade kit for 16K Spectrum (Issue 2 only) £26.09 (£28). Fuller master unit for the Spectrum including speech synthesizer, sound synthesizer, amplifier and joystick ports £47.78 (£56). ZX microdrive n/a (n/a). ZX rs232 n/a (n/a). Keyboards with space bars for the ZX81 and the Spectrum £36 (£41). ZX printer £34.74 (£50). 5 printer rolls £10.43 (£16). ZX81 £43.43 (£52). ZX81 16K ram packs £26.04 (£28). New luxury spectrum computers 48K with full sized typewriter keyboards complete with normal space bar enclosed in a larger plastic case which also houses the power supply and the computer pcb £138.20 (£174).

COMMODORE COMPUTERS

Commodore 64 £299 (£309). Special offer package:- Vic 20 + cassette recorder + basic course + 4 games £121 (£149). Convertor to allow the use of most ordinary mono cassette recorders with the Vic 20 and the Commodore 64 built £8 (£9), kit £6 (£7). Commodore cassette recorder £36.50 (£44). We stock most accessories.

OTHER COMPUTERS

Colour Genie £168 (£178). BBC Model B £424 (£440). Texas TI99/4A £139 (£169). Atari 800 £347 (£380). Atari 400 16K with basic £173 (£215).

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The object of Bomb Run is to rescue as many of the twenty patients as possible from a minefield, by manoeuvering the stretcher team through various hazards.

The keys used are the cursor keys, but any other combination may be used with minimum adjustment.

The hazards include bombs, which are slow, but lethal if a direct hit is scored, mines and flitters. The mines can be deactivated by covering them with sand, i.e. walking straight through them, but are deadly if stepped upon. The flitter, a flying bomb, is also deadly. It appears every third rescued patient, and reactivates the mines by pulling them up through the sand.

Patient Pick-up

The patients are placed in random positions, and are picked up by carefully positioning the stretcher team under them. The falling bombs may sometimes render the wounded invisible, by covering them in sand. Once on the stretcher, the patient must be deposited on an empty section of the safe green strip at the edge of the field.

The game ends when you have been killed, or have rescued all the wounded. At the end your score is given, along with a repeat option.

The game takes up 5K, and will consequently fit into either Spectrum. To save typing, lines 5-55 could be omitted. For those who know how, the game could be compiled into machine code to speed it up.

Please note that the letters in quotes in lines 100, 140, 170, 200, 210, 270, 500, 504, 530, 750, 770 and 900 are graphics, and should be entered in the graphics mode. It may help to enter and run lines 1000 to 1095 before the rest of the program to make this easier.

HOW IT RUNS

Line 10	Sets colour
Lines 20-40	Title sequence. Not strictly necessary.
Lines 50-60	Start of actual program. Line 56 turns caps lock on, line 60 goes to user graphics routine.
Line 70	Initializes variables.
Line 80	Sets new colour.
Line 90	Sets up two arrays for co-ordinates of mines, and then fills arrays with random numbers.
Line 100	Prints mines on screen.
Line 110	Prints green strip.
Line 115	Goes to subroutine for printing the patient.
Line 120	Picks random co-ordinates for bombs, and checks that they are not the same as the patient's co-ordinates.
Line 130	Start of main loop.
Line 140	Prints and then erases the stretcher team.
Lines 150-160	Controls movement of stretcher team.

Lines170	Prints bombs.
Lines175	Provides dropping tone.
Lines 180-185	Detects if either bomb has struck any part of the stretcher team, if so goes to end game routine.
Lines186	Detects if the stretcher team has walked on a mine, if so goes to end game routine.
Line 190	Goes to flitter routine if score has increased by three since flitter last appeared.
Line 200	Checks if patient has been picked up. If so, sounds a tone and changes the stretcher to an occupied one.
Line 210	Goes to routine for incrementing score if an occupied stretcher has reached green strip.
Line 220	Checks if all patients rescued. If so, goes to end game routine.
Lines 270-280	Print explosions of bombs, and erases them.
Line 290	Returns to start of loop if finished.
Line 500	Prints stretcher team in current position, erases bombs.
Lines 504-520	Select co-ordinates for flitter, print and erase flitter, move it across and up/down screen. Line 505 checks if flitter has hit the stretcher team.
Line 530	Re-prints mines and prints patient on ground. Returns to main loop.
Line 700	Sounds tone, increments score and updates score indicator.
Lines 750-770	Print patient, sound tone, return to main loop.
Lines 900-910	Sound tone, clear screen, set colours.
Line 920	Prints message.
Lines 930-935	Concerned with spelling of "patients"/"patient".
Lines 940-950	Print messages.
Line 960	Waits for appropriate keypress.
Line 970	Re-runs program if "Y" pressed.
Line 1000-1096	User-defined graphics.

HINTS ON CONVERSION

Bomb Run is written in Sinclair Spectrum BASIC. Most of the conversions will centre around the screen lay-out, and the Spectrum's screen is a grid of 21 by 32 squares. The PRINT AT statement should be replaced by screen POKEs or your machine's particular method of printing to the screen.

The game makes frequent use of the INKEY$ function, which will have to be replaced with GET, and the space-saveing lines 150-160 will probably have to be altered.

the ATTR function has been used only twice, but will have to be replaced by PEEK statements. It is used in finding values from a specified point on the screen.

Unless you own another Sinclair machine, the title sequence is best ommitted, as it uses the string slicing techniques found only on these computers. If you really do need it, X$(N) means the Nth element of X$ and MID$ etc, should be used instead.

Random number generating methods will probably need changing. The statement (RND*X)+Y means a random number between X and Y.

The rest of the program should be easy to convert, with colour and sound being self-explanatory. Simply by adding more routines you could expand the game tremendously. If your machine has sprite graphics, the smoothness of the display could be increased, and you could improve the sound effects by quite a lot on a machine as a BBC.

Variables Used

A	General purpose
X,Y	Co-ordinates of stretcher team
Score	Current score
NSC	Counter for flitter
C$	Contains graphics for stretcher
A,B	(arrays) Co-ordinates of mines
C	General purpose
D	X co-ordinate of 1st bomb
E	X co-ordinate of 2nd bomb
F	Main loop counter
G,H	Co-ordinates of patient
A$,B$	Used in title sequence

PROGRAM LISTING

```
   5 REM **********
   6 REM *BOMB RUN*
   7 REM **********
  10 BORDER 0: PAPER 0: CLS
  20 LET A$="BOMB RUN": LET B$="
P U S H   A   K E Y   T O   R U N"
  30 FOR A=8 TO 1 STEP -1: PRINT
 AT 8,A+12; BRIGHT 1; INK INT (A
ND*6)+2;A$(A): BEEP .1,RND*60: B
EEP .01,RND*60: NEXT A
  40 FOR A=1 TO 29: PRINT AT 12,
A; BRIGHT 1; INK INT (RND*6)+2;B
$(A): BEEP .01,RND*60: BEEP .01,
RND*60: NEXT A
  50 IF INKEY$="" THEN GO TO 50
  55 BEEP .2,30
  56 POKE 23658,8
  60 GO SUB 1000: REM U.D.G
  70 LET X=10: LET Y=10: LET SCO
RE=0: LET NSC=0: LET C$="LH"
  80 BORDER 6: PAPER 6: CLS
  90 DIM A(20): DIM B(20): FOR C
=1 TO 20: LET A(C)=INT (RND*20)+
1: LET B(C)=INT (RND*29)+1: NEXT
 C
 100 FOR C=1 TO 20: PRINT AT A(C
),B(C); INK 0; BRIGHT 1;"R": NEX
T C
 110 FOR A=0 TO 21: PRINT AT A,3
1; INK 4;"■": NEXT A
 115 GO SUB 750
 120 LET D=INT (RND*29)+1: LET E
=INT (RND*29)+1: IF D=E THEN GO
TO 120: IF D=H OR D=H+1 OR E=H O
R E=H+1 THEN GO TO 120
 130 FOR F=1 TO 10+(RND*9)
 140 INK 1: FOR A=1 TO 3: PRINT
AT X,Y;"E";C$;"E";AT X+1,Y;"F F
": NEXT A: PRINT AT X,Y;"  ";A
T X+1,Y;"  "
 150 LET X=X+(INKEY$="6" AND X<2
0)-(INKEY$="7" AND X>0)
 160 LET Y=Y+(INKEY$="6" AND Y<2
7)-(INKEY$="5" AND Y>0)
 170 INK 0: PRINT ;AT F,D;" ";AT
 F+1,D;"A";AT F+2,D;"B";AT F,E;"
";AT F+1,E;"C";AT F+2,E;"D"
 175 BEEP .02,20-F
 180 IF X=F+2 AND Y+3>=D AND Y<=
D THEN GO TO 900
 185 IF X=F+2 AND Y+3>=E AND Y<=
E THEN GO TO 900
 186 IF ATTR (X+2,Y)=112 OR ATTR
 (X+2,Y+3)=112 THEN GO TO 900
 190 IF SCORE-NSC=3 THEN LET NSC
=NSC+3: GO SUB 500
 200 IF G=X AND H=Y THEN BEEP .2
,-1: BEEP .2,0: LET C$="GH":
 210 IF ATTR (X,Y+4)=52 AND C$="
GH" THEN GO SUB 700
 260 NEXT F
 270 INK 2: PRINT AT F,D;"I";AT
F+1,D;"J";AT F,E;"K";AT F+1,E;"I
"
 280 PRINT AT F,D;" ";AT F+1,D;"
";AT F,E;" ";AT F+1,E;" "
 290 GO TO 120
 400 BEEP 1,0: BEEP 1,30: BEEP 1
,20: LET SCORE=SCORE+5: GO TO 11
0
 410 RETURN
 500 PRINT AT X,Y; INK 1;"E";C$;
"E";AT X+1,Y;"F  F": FOR A=1 TO
2: PRINT AT F+A,D;" ";AT F+A,E;"
 ": NEXT A
 504 LET P=INT (RND*19)+1: FOR Q
=1 TO 30: FOR A=1 TO 3: PRINT AT
 P,Q;"P";AT P+1,Q;"Q": NEXT A: P
RINT AT P,Q;" ";AT P+1,Q;" ":
 505 IF P=X AND Q=Y THEN GO TO 9
00
 510 LET P=P+(RND>.5 AND P<20)-(
RND<.5 AND P>0)
 520 NEXT Q
 530 FOR C=1 TO 20: PRINT AT A(C
),B(C); INK 0; BRIGHT 1;"R": NEX
T C: PRINT AT G,H; INK 3;"NO": R
ETURN
 700 BEEP .1,2: BEEP .1,4: LET S
CORE=SCORE+1: FOR A=1 TO SCORE:
PRINT AT A,31;"*": NEXT A
 750 LET G=INT (RND*18)+3: LET H
=INT (RND*25)+1: PRINT AT G,H; I
NK 3;"NO": GO TO 770
 770 BEEP .1,1: BEEP .1,2: LET C
$="LH": RETURN
 780 STOP
 900 FOR A=1 TO 10: BEEP .02,50:
 BEEP .03,50: BEEP .001,40: PRIN
T AT X,Y; INK 2;"JKI": NEXT A
 910 BORDER 0: PAPER 0: INK 6: C
LS
 920 PRINT AT 4,10; BRIGHT 1;"GA
ME OVER"
 930 IF score=1 THEN LET d$=" ":
 GO TO 940
 935 LET d$="s"
 940 PRINT AT 10,0;"You were ki
lled after rescuing";score;" pat
ient";d$
 950 PRINT AT 18,4;"Another try?
 (Y/N)"
 960 IF INKEY$<>"Y" AND INKEY$<>
"N" THEN GO TO 950
 970 IF INKEY$="Y" THEN GO TO 70
 999 STOP
1000 FOR A=1 TO 16: FOR B=0 TO 7
: READ C: POKE USR CHR$ (A+143)+
B,C: NEXT B: NEXT A
1010 DATA 231,231,255,126,60,60,
60,60
1015 DATA 60,60,60,60,60,60,60,2
4
1020 DATA 24,126,126,60,24,126,6
0,24
1025 DATA 24,24,24,24,24,24,24,2
4
1030 DATA 60,56,16,56,56,63,56,5
5
1035 DATA 56,48,48,48,48,48,48,6
0
1040 DATA 0,126,129,255,255,127,
0,0
1045 DATA 0,0,251,255,255,254,0,
0
1050 DATA 32,6,99,58,251,126,126
,45
1055 DATA 9,66,216,214,244,124,2
35,156
1060 DATA 129,200,35,122,234,39,
189,157
1065 DATA 0,0,0,128,255,127,0,0
1070 DATA 0,0,0,1,255,254,0,0
1075 DATA 0,0,0,0,129,129,255,0
1080 DATA 0,0,0,1,251,255,255,0
1085 DATA 0,60,126,255,235,126,0
0,24
1090 DATA 24,60,126,255,235,126,
60,0
1095 DATA 0,60,24,126,24,255,60,
60
1096 RETURN
9998 BORDER 6: PAPER 6: INK 0: C
LS
```

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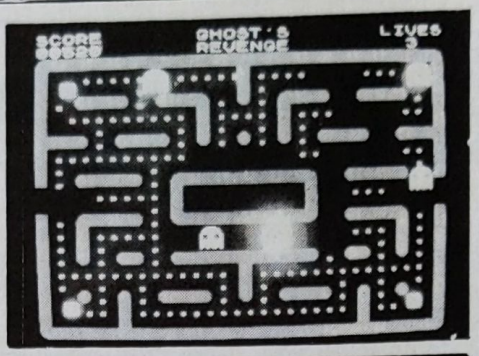

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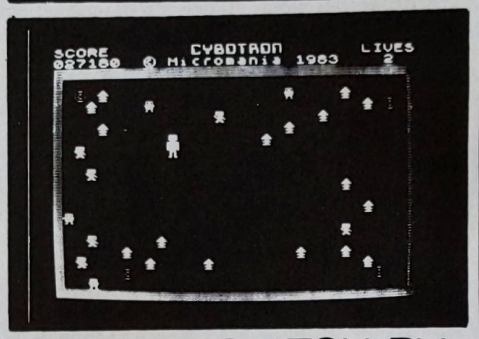

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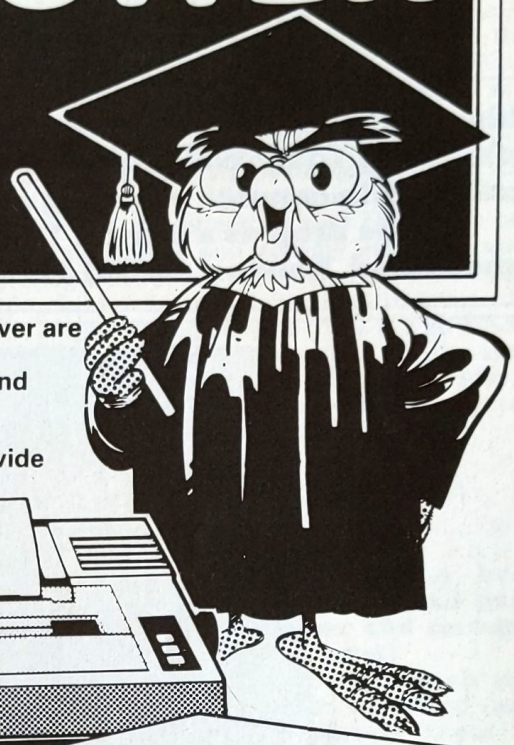

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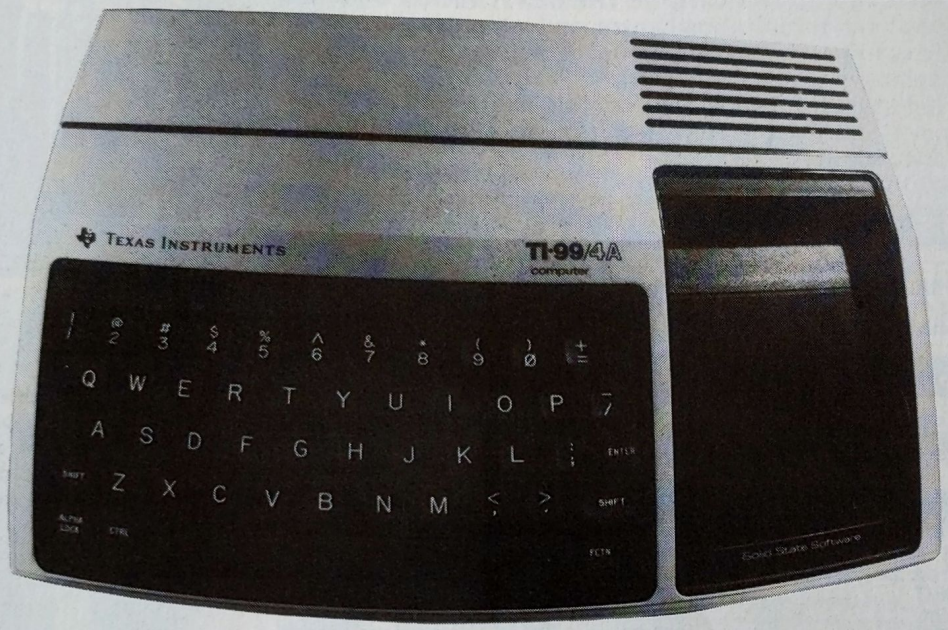


Dear PCT
Spectrum Zap — February 1983. With reference to the aforementioned program published in your magazine I am writing to inform you that I have topped the high-score mentioned in the article. I have achieved 122,915 points. Just for the record I have asked my parents to verify this.
Yours faithfully
T G Crump

Editor's reply: Well done on achieving that score, it's the highest so far. If anyone has beaten this one how about writing in to tell us?

Dear PCT
I have just started to buy your magazine and I have also just bought a Philips G7000 Video Computer System.

Since I started to get PCT I haven't seen any information about the computer or any programs for it.

So I would be very grateful if, in one issue, you could put some information in PCT about it.
Yours sincerely
Joseph Brischuk
(no address)

Editors's reply: I am sorry to say judging from your letters that you have been gravely misled into believing that your Philips G7000 is a computer. It's not. You can only use cartridges which are made by Philips specially for the machine. You cannot enter your own programs and save them on the system although there is a BASIC programmer's kit which teaches you about the programming language BASIC. The system's name comes from the fact that it is microprocessor based, but I must stress that it's *not* a computer in the true sense of the word.

Occasionally we print information about similar systems, mainly regarding new software releases by manufacturers. You will find more information for the G7000 in a magazine called Computer and Video Games — why not have a look at that? You'll find it on sale at most newsagents.

Dear PCT
Why, oh why can you not show a good adventure game for the Commodore VIC 20? You never seem to have games for the Expanded machine and I don't see why not.

I like all sorts of games from Cosmic shoot-outs to pontoon, but I like adventure games best but you never seem to have any. Help!
Yours faithfully
Darren Phillips
(no address)

Editor's reply: The simple fact is that nobody has sent in an adventure game for the VIC 20 which I feel is suitable to publish within *Personal Computing Today*. **Perhaps this is a good time to suggest that anyone out there with a VIC adventure in the making would like to submit it to us for publication.**

Dear Sir

I am writing in full support of the letter which appeared in your July edition from Mr Toby Green on the lack of programs for the Tandy TRS-80 Level 2.

Your reply was that it is hard to keep all readers happy. On looking back through old editions the owners of Sinclair, Commodore Atari and BBC machines are always well catered for. The Sinclair owners alone have a great selection of magazines as it is.

A view shared by other Tandy owners is that we seem to be the poor relatives of the computer magazines.

I would like to add my word of congratulations on your magazine and hopefully look forward to some Tandy programs.

Yours faithfully
Mr G Pinfold
Tamworth

Editor's reply: I agree with you that Sinclair Spectrum owners have a wide choice of magazines to buy specifically for their machine. It is true that the machines you mention are well catered for in *Personal Computing Today*. **This boils down to the fact that the majority of our readers are owners of those machines and it is therefore necessary to print programs for them. However, I am also well aware that there are owners of other machines, like yourself and TI99/4a owners, who feel they are left out in the cold a bit. And that's why I print programs for your computers from time to time. Rest assured that a program for the Tandy is appearing in this issue.**

Dear Sir

On reading the May issue of PCT I noticed that you are forming a review team for Commodore 64 software. I would be only too happy to assist you, having used a VIC 20 previously I have now upgraded to the 64.

I found the game *Chase* in that issue excellent, and it converted very well to the 64. The one area though that I feel you have done more for than most of the other magazines is the utilities — the single key entry was very useful indeed and once it was running with my own modifications to the keywords, saved me hours of keyboarding.

It's a great magazine; keep up the good work.

Yours faithfully
Eric Davies
Chester

Editor's reply: Thank you very much for volunteering your services as a CBM 64 reviewer — we'll send you some software to scrutinise as soon as possible. Thanks also for your kind words about *Personal Computing Today*. **It's good to hear that you have found the magazine useful in your programming and hope that you will continue to do so.**

Dear PCT

In reply to a letter printed in your July issue I suggest that Mrs C Morden should consider the facts before calling the VIC 20 a 'games machine'

Yes, we all know that the VIC is suitable for playing games, but isn't the ZX Spectrum, or Oric 1, with their 'special' commands like DRAW, POINT, and CIRCLE? Apart from the BBC Micro computer the VIC 20 must have the widest choice of business and home software available for it. Try buying software like English, chemistry, mathematics revision for Spectrum or Oric and you may find you are talking to yourself.

The fact is that the Spectrum and Oric were built purely for playing games and nothing else. Try word-processing using a keyboard that feels like 'dead flesh'.

Also, may I take the opportunity of correcting a few facts in your excellent magazine. If there are no BASIC extensions (toolkits) available then what are the super expander and programmers aid cartridges? Also, I enclose a program that draws three sine and cosine curves in hi-resolution on the standard VIC 20.

Yours sincerely
C A Pucci
(no address)

Editor's reply: You are obviously a keen supporter of the Commodore VIC 20 and quite rightly so as it is a good machine and certainly one of the best selling on the market.

I am sure that both Sinclair Research and Oric Products would be most offended and indeed, angry, to hear you accuse them of producing computers only fit to play games on, as this is just not true. There is certainly large amount of educational software on sale for the Spectrum and both machines are well supported in the utilities and home business field.

Thank you for pointing out a couple of errors in the magazine — note has been made of them. Thanks for writing to *Personal Computing Today* **and for sending in a program for possible publication.**

Dear Personal Computing Today

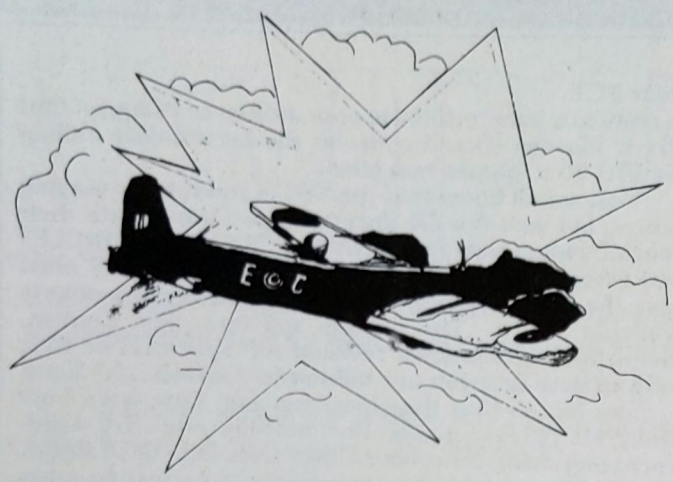
I am writing to complain about the instructions that are given with some of the program which you print in your magazine.

I think that they should be explained more fully as I quite often don't understand exactly how to do what they tell you to. This may be because I am new to the subject of computers and have a lot to learn. It may be that if I knew how to use the computer which the program was for, I would understand the instructions.

However, I suspect that other readers would agree with me.

Yours sincerely
Nicholas Addington
Bury St Edmunds

Editor's reply: It is difficult when you start to use computers if only because in many cases the subject is shrouded in jargon. As *Personal Computing Today* **is essentially a magazine for the computer novice I appreciate that instructions for programs carried within our pages must be clearly explained for all to understand. However, I do not feel that we are guilty of poor instructions. Nevertheless I will make sure that all future programs are explained as fully and as clearly as possible.**



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SOFTWORDS

SOFTWORDS has a readership of more than 35,000 to home micro owners each month, yet you will not find SOFTWORDS in any newsagents.

SOFTWORDS is filled with in-depth reviews of the latest and the best programs from the many hundreds of software publishers, yet SOFTWORDS is not for sale.

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SOFTWORDS will soon be including hardware reviews and offers, program listings, and hints and tips, yet it will remain free of charge.

IS A STRANGE MAGAZINE

SOFTWORDS is the magazine of the Microcomputer Software Club. It is available, free of charge, to members only. Why don't you become a member?

THE MicroComputer SOFTWARE CLUB

The Microcomputer Software Club exists to provide its members with quality software at low prices. Its 35,000 members have all realised that membership of the Club takes the gamble out of buying software. Fancy packaging and glossy advertising do not impress us — a program has to be good to be recommended to members in SOFTWORDS. We test for loading, unique features, value for money, use of the computer's capabilities, reliability, speed and playability, or in the case of non-games programs, their suitability for the job they are to undertake. All kinds of program are included: arcade; adventure; strategy; utilities; educational; practical/business applications.

All of the programs recommended in SOFTWORDS are available direct from the Club at low prices — minimally 10% cheaper than normal and, for the program we feel is the best available each month, 20% cheaper than usual prices. Ordering is simple, and quality is guaranteed. Recent selections have included **The Hobbit, Wacky Waiters, Masterfile, Spectres, Space Phreeks, Chess:The Turk, Wizard War,** and many other educational and practical programs — all at low membership prices.

Surprisingly, perhaps, membership of the Club is completely free of charge. There is no obligation to buy a certain number of programs — members buy what they want when they want. Receipt of SOFTWORDS is automatic and free and postage and packing is free as well. Sounds too good to be true? Try it and find out.

If you own or regularly use a ZX81(16K), Spectrum, BBC, Dragon, VIC-20, Commodore 64 or Oric, join the Club.

Free membership application

Please accept my application and enrol me as a member of The Microcomputer Software Club. I understand that membership is free of charge.

As a member I will receive the Club Newsletter free of charge and will be entitled to benefit from any savings offered to members on selected programs for microcomputers. I may cancel my membership at any time.

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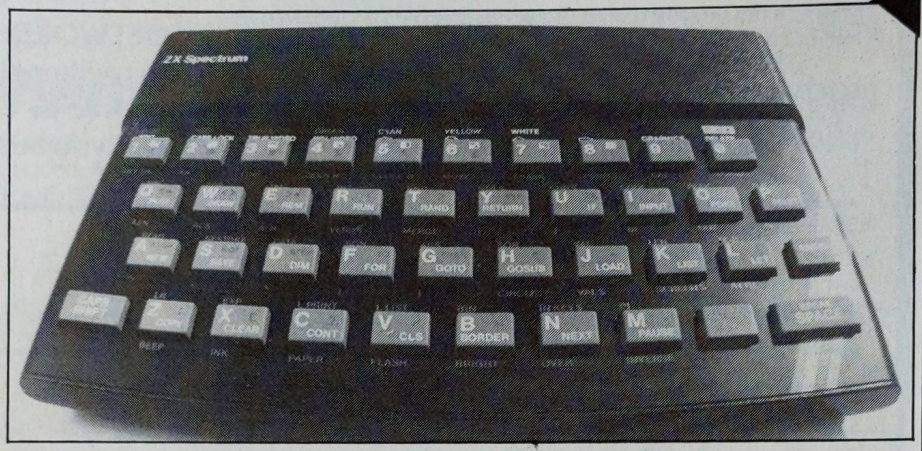
Personal Computing Today

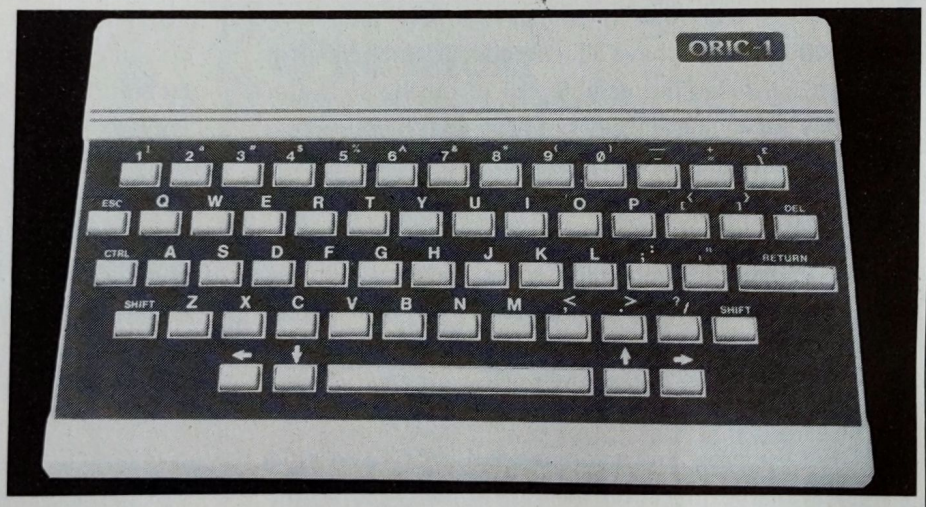
Oric V Spectrum

Don't miss next months' issue of Personal Computing Today. It's a must for Oric and Spectrum owners as you'll find a complete and detailed comparative review of both machines.

When we first reviewed the Oric 1 it was with a pre-production model which unfortunately didn't come up to scratch performance wise. Now that Orics are around in quantity we thought it was only fair to review a 'proper' machine. As the Spectrum is really its nearest rival it was the obvious choice to make for a comparison.

Both machines cost around the £100 mark and sport similar facilities concerning memory size and graphics facilities. We will also be investigating the state of Oric software and generally sum up on how it compares to Spectrum packages for quality and availability. This will be particularly interesting in the light of new firms venturing into the Oric software market in recent months.





Educational Software

Doubtless there are many amongst you who use your micro computer for educational purposes, be it for your own use at school to help you with your schoolwork, or for your children to learn the rudiments of computer programming. Much software is now on the market specially aimed at thos interested in education. This area has not been covered to a great extent, if at all, within the pages of Personal Computing Today. To rectify this the October issue of the magazine will run a special feature on educational software for a variety of machines. Because the main computers in schools are the BBC Micro, the Spectrum and ZX 81 these will be under the spotlight.

Programs

As usual we'll be running fantastic programs to run on a whole range of computers including the Spectrum, Dragon, Oric, Commodore 64 and VIC 20 and BBC. These will be a hotch potch of games and useful utilities for you to play around with at will.

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Announcing more exciting programs for the BBC.

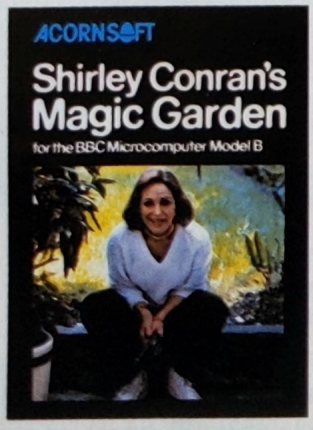
Acornsoft is the software division of Acorn Computers, the company that designed and built the BBC Microcomputer. Here are four more exciting programs, all designed to get the most from your BBC Micro.

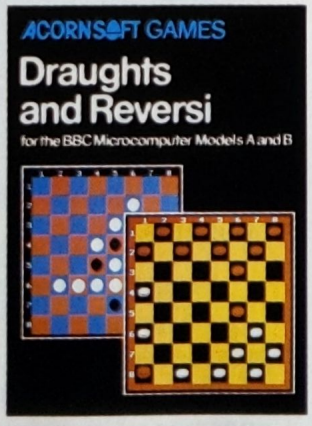
Magic Garden (£9.95) is a cassette based on Shirley Conran's successful book. It's a problem-solving program which provides the complete beginner with instant answers to the questions of what to plant and where. Simply tell the computer whether you prefer a shrub or a flower, the type of soil, light and shade conditions and required flowering time and the computer will come up with a selection of possible plants.

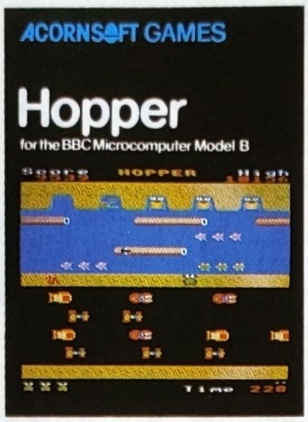
Draughts & Reversi (£9.95) is a cassette containing two traditional board games for you to play against the computer. Both give a graphic display of the board on the screen and you can enter your moves with either keyboard or joystick. The games can be played at varying levels of difficulty and on the higher levels you will find the computer to be a very worthy adversary.

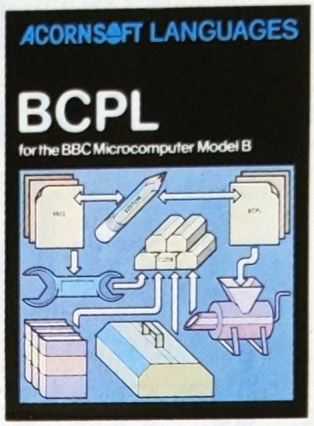
Hopper (£9.95) is a game on cassette which can be played with either keyboard or joysticks. Hop the frog across the busy motorway trying to avoid four lanes of fast-moving traffic. To get across the river to the frog's lair you must leap on to the logs and turtles' backs, but beware of the diving turtles, the crocodile and the snake.

BCPL (£99.65) is a flexible modern structured language that's very easy to learn. The package consists of a BCPL language ROM, a 40/80 disc and a 450 page User Guide. The disc contains the BCPL Computer, a Screen Editor and a 6502 Assembler. BCPL is particularly good at handling Input and Output and is ideal for writing utility programs and to develop games and commercial packages.









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Three out of every four computers going into schools are BBC Micros. Is there a lesson to be learned by every user?

As part of the current government subsidised scheme aimed at introducing micros to schools, the Department of Industry undertook a survey of machines available and made recommendations to education authorities all over the country.

The BBC Micro met their priorities exactly: it is economical yet fast and powerful, and it can justify the investment involved, through its capability to grow with the needs of the user and with the rapid changes in technology.

Teachers and education authorities agreed, and today it represents over three-quarters of all micros being ordered for schools across the country under the DOI scheme.

The BBC's choice too.

In choosing a machine to put their name to for their massive Computer Literacy Project, the BBC had the same set of priorities as the DOI. The BBC Micro is now an integral part of that project, which includes books, software, courses and a number of major television series, one of which, "Making the Most of the Micro" is now being broadcast.

All this for only £399.

The BBC Micro is light and compact. It generates high resolution colour graphics, and is capable of synthesising music and speech using its own internal speaker. The keyboard uses a conventional layout and typewriter feel.

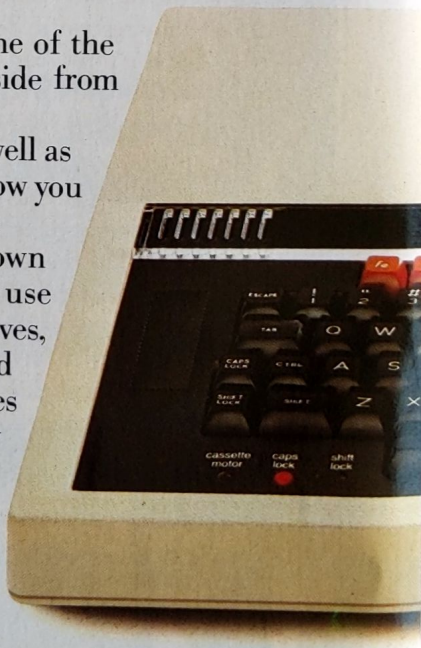
The most sophisticated version (called Model B) is available for only £399. (There is also a basic model available, the Model A, at £299.)

Designed to grow.

Last year the magazine "Which Micro?" said that the most attractive and exciting feature of the BBC Microcomputer was its 'enormous potential for expansion'.

This is indeed one of the features that sets it aside from the competition.

For example, as well as interface sockets to allow you to connect to a cassette recorder, and to your own television, you can also use video monitors, disc drives, printers (dot matrix and daisy wheel) and paddles for games or laboratory use.



You can also plug in ROM cartridges containing games with specialist application programs.

The Tube. A unique feature.

The Tube, which is unique to the BBC Micro, provides for the addition of a second processor via a high speed data channel. The possibilities are enormous. For example, the addition of a second

3MHz 6502 processor with 64K of RAM doubles processing speed. While a Z80 with 64K of RAM opens the door to a fully CP/M* compatible operating system, with all the benefits for business applications.

Linking up with other computers.

The BBC Micro also offers a facility of immense potential value to schools, colleges and businesses. It's called Econet® – a system which uses telephone cable to link with other BBC Micros. A number of machines can then share the use of expensive disc drive and printer facilities.

Make full use of Prestel & Teletext.

With special adaptors you will not only be able to turn your TV set into a Prestel terminal and Teletext receiver, but you can also take data and programs direct from these services. (The programs, which are known as telesoftware, are already being broadcast by BBC's Ceefax service.) This is another first for the BBC Micro.

BASIC plus.

A sophisticated version of BASIC has been chosen for the BBC Micro, which incorporates features normally found only in more advanced high level languages. However, there is also a facility allowing access through a simple command to another language – for example, PASCAL, FORTH and LISP.

*Trademark of Digital Research.

A full range of software.

Applications software for the BBC Micro already cover a very wide field. Packages covering games, education and business applications are available on cassette. All developed to the same high standards set by the hardware.

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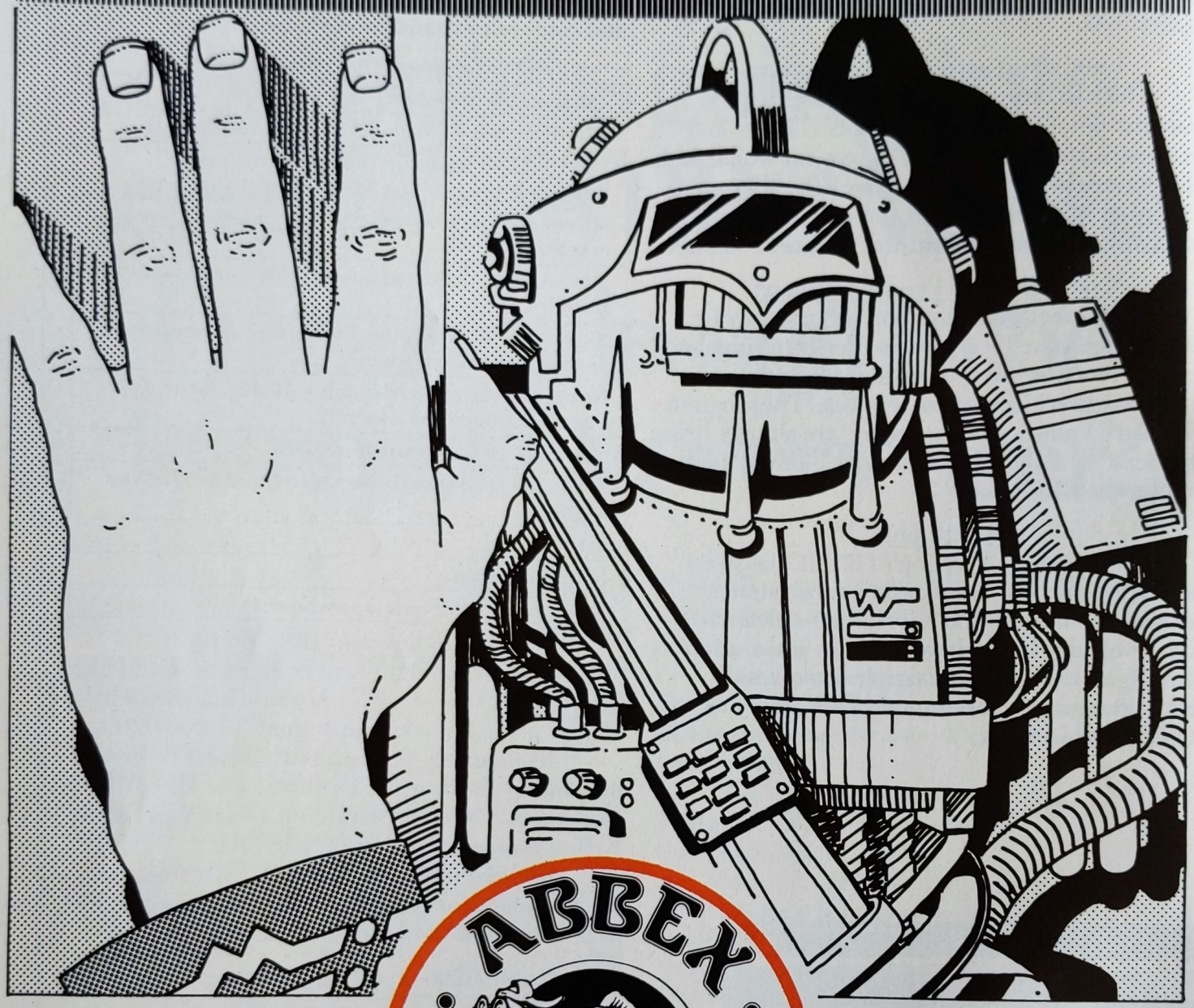

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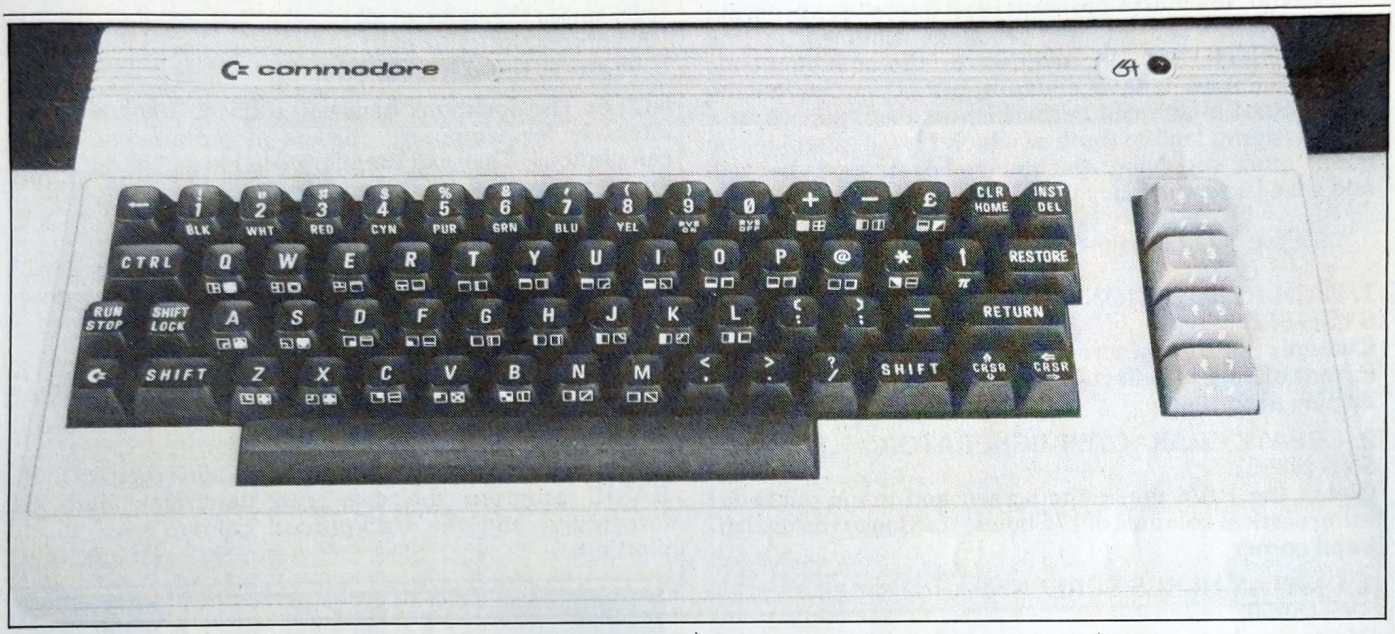
PCT-1

PROGRAMMING TECHNIQUE

VIC HI-RES

Achieve more interesting graphics on your VIC 20 with J. Vandecasteele's high-resolution program.



This program is essentially composed of a set of machine-code subroutines, which provide the user with fast high-resolution initiation and fast plotting (or unplotting) of dots, lines or chains. In addition you will be able to use these routines in your own programs where high-resolution is desirable, but where speed is too. It runs on a VIC 20 with at least 8K RAM expansion.

High-resolution graphics have become part of the stock and trade on the home computer market; sadly, it is an area where the VIC 20 tends to lag behind. The facility can be added in ROM (at a cost of £35.00), but if you have expanded your machine with extra RAM, you have to buy an adapter of some kind that allows the use of two or more cartridges at the same time. In addition, all programs devised with the aid of the new ROMs are limited to be played on machines similarly endowed.

There are, of course, people among us with other interests than high-resolution, to these it would be "nice" to have the facility available, but they can't justify the extra cost.

Of course there are ways of acheiving hi-resolution through BASIC, but it is a tedious task, and the slow reaction of the machine tends to make its use prohibitive: it takes quite some time for the screen to be initiated (getting slowly cluttered and then uncluttered), and when ready, the plotting routing that follows seems to compete for slowness, so that when you finally have succeeded in drawing that square you discover that it's long past bed-time!!!

If you have agreed with me up to now, you might be interested in what follows. A word of warning: this article is not meant as a replacement for the High-Resolution cartridge but it will hopefully make up for some of the lacks in the original ROMs.

The program in this article will provide you with:

- —fast text-mode/hi-resolution change over,
- —hi-resolution screen of 160 × 176 Pixels,
- —fast plotting and unplotting of:
  - —individual dots,
  - —lines,
  - —chains of lines,
- —saving pictures to tape (with binary saving),
- —loading pictures saved as above,
- —printing the picture on the VIC printer.

In addition, once you have understood and mastered the machine-code subroutines you will be able to use these in your own programs.

The Program

Up to now, I have been talking of "a" program, in fact this article is about four programs adding up to what I describe as a package. These four programs are saved in succession and are chain-loaders. That means that each one of them loads the next.

The first of these programs, as you might well guess, does a bit of shifting in the old RAM! Effectively, it changes the screen base address from 4096 back to 7680; it also provides some space for the machine-code (1000 odd bytes), and protected from BASIC it reserves the space between 4096 and 7680 for the creation of a user-defined character generator.

The second program sets out to fill all the space reserved for machine-code (which is the heart of the package). These first two programs are the essence of the package, what follows is in effect no more than an application, and you can change that at will. (You might be deterred by the time it takes to load this program, but remember that once the code is in memory, you can new ▶

VIC HI-RES

and load a variety of BASIC programs, using these subroutines until the machine is turned off!)

At the end of the second program, a small BASIC routine asks you if you want "INSTRUCTIONS" or not, depending on your answer it will load "INSTRUCTIONS" or "PROGRAM" (if you feel confident without these instructions you can omit their listing, and change the above routine accordingly).

As stated the third program is a set of instructions which outlines the following program and on completion, loads it.

Lastly, the fourth program is an interactive program that performs all of the functions outlined in the "INSTRUCTIONS". In addition to the machine-code based functions I have added a BASIC circle-drawing routine (not mentioned in the Instructions), as well as a printer/dump facility (both of which I hope to replace by much more satisfying machine-code routines, that will add speed and efficiency to these tedious tasks.

The Machine-Code

1. HIGH-RESOLUTION SCREEN FORMATTER
SYS(9142)
Changes the normal screen format to a double-character format of 20 × 11 (effectively 20 × 22), and re-centers the display accordingly.

2. CREATE CHARACTER-GENERATOR
SYS (8890)
Clears the RAM under the screen and maps the latter using vertical columns of 176 bytes, starting at the top left-hand corner.

3. DISPLAY HI-RES SCREEN
SYS (8950)
Displays whatever picture is stored in the character-generator.

4. TEXT-MODE
SYS (9190)
Redirects BASIC to the normal character-generator, and reestablishes the normal screen format.

5. PLOT A DOT
POKE 1000,x:POKE 1001,y:POKE 1020,1:SYS(8200)
Plots a dot at x,y if PEEK(1020) = 1, unplots if PEEK(1020) = 0.

6. PLOT A LINE
POKE 1002-5,x1,x2,y1,y2 respectively:POKE 1020,1 (or 0 for unplot):SYS(8340)
Calculates the increments and deposits each value for x & y in 1000 & 1001 respectively; calls the plot a dot routine; calculates next coordinates and so until it reaches x2,y2.

7. PLOT A CHAIN(n SEGMENTS)
POKE990,n *2:POKE828 + n + 1,x(n + 1):POKE829 + n + 1,y(n + 1):POKE1020,1(or 0 for unplot):SYS(9010)
Retrieves the coordinates of the peaks from the cassette buffer and deposits them four at a time in 1002-1005 then calls plot-a-line routine and returns for the next four; Counter in 990 indicates completion of chain.

8. SAVE TO TAPE
SYS(9080)
Saves the character generator to tape using binary (program) save, considerably faster than ordinary ASCI type file.

9. LOAD FROM TAPE
SYS(9114)
Loads the character generator with a drawing deposited on tape by the preceding subroutine.

MEMORY LOCATIONS

Plotting Routine

1000 stores value of x
1001 stores value of y
1020 (1 or 0) pointer for plot/unplot

Line Plotting Routine

1002 stores the value of x1
1003 stores the value of x2
1004 stores the value of y1
1005 stores the value of y2

NOTE: The locations between 1005 & 1024 are used intensely for temporary storage of parameters during calculations. They will therefore need to be left out of any long term parameter storage allocation.

Chains

990 stores the number of segments (multiplied by 2) 828 to... 989 (max.) each block of 2 memory locations stores the x,y coordinates of a peak of the chain.

Others

36879 colour of screen & border register
646 plotting colour register

By changing these the values in these two registers in the BASIC program the user can determine both the foreground and the background colours used in the plotting.

HOW IT RUNS

1-2 Dimension the arrays for printer routine & provide data for binary conversions.
6-18 Menu
19-36 Input command and direct program to routine required
37-38 UNDO routine
39-41 Determine which of the options is to be plotted (unplotted) and direct the program to relevant routine.
178-179 Initiate hi-resolution screen with a clear character generator.
200-208 Line routine; ask for coordinates transfer them into relevant memory locations and call routine.
300-600 Circle routine (more or less similar to the routine in VIC REVEALED);
385-395 Ensure circle is clipped if oversized.
1000-1800 Printer routine;
1004-1092 Convert a row of the character generator to a binary array
1300-1600 Convert the array into a printable character and print it in graphics mode.
2067-2095 Chain routine; ask numbers of segments and set the counter at 990 accordingly; then ask for each set of x,y coordinates and poke them in memory starting at 828; plot or unplot the chain.
4000 Re-initiates hi-res screen without clearing the character generator.
5000-5007 Restore normal screen and ROM character generator.
7000-8004 SAVE & LOAD routines.

PROGRAM LISTING 1

```
1 POKE36879,8:PRINT"■■■
```

PROGRAM LISTING 2

```
1 POKE36879,93:PRINT"■■■
```

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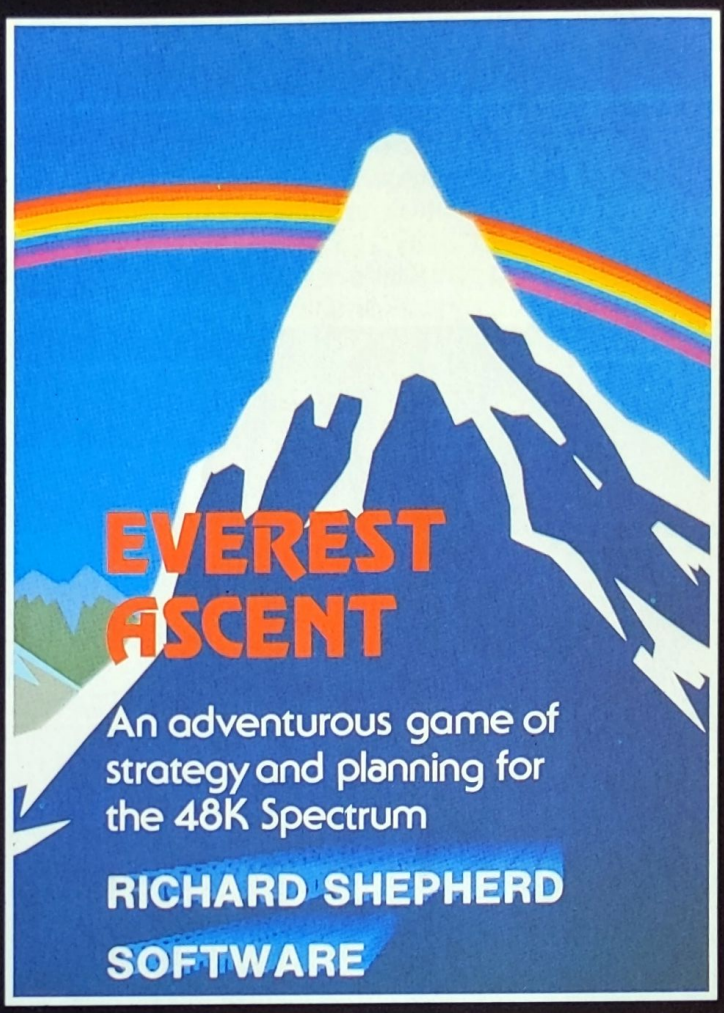

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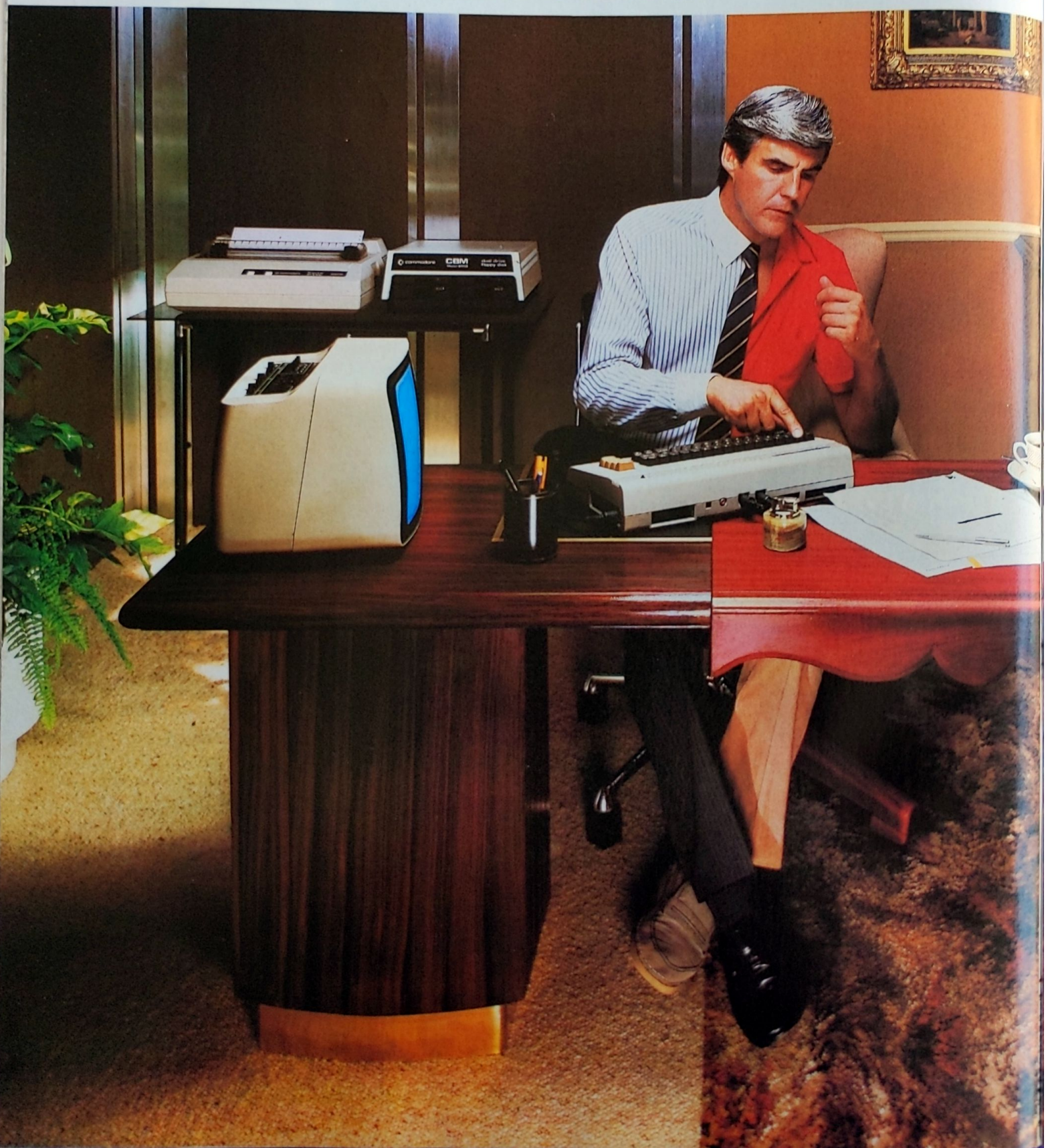

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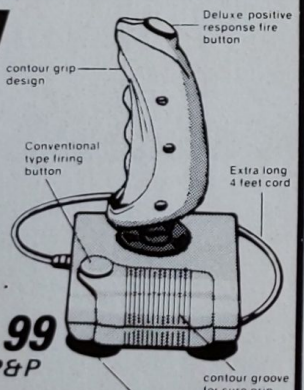

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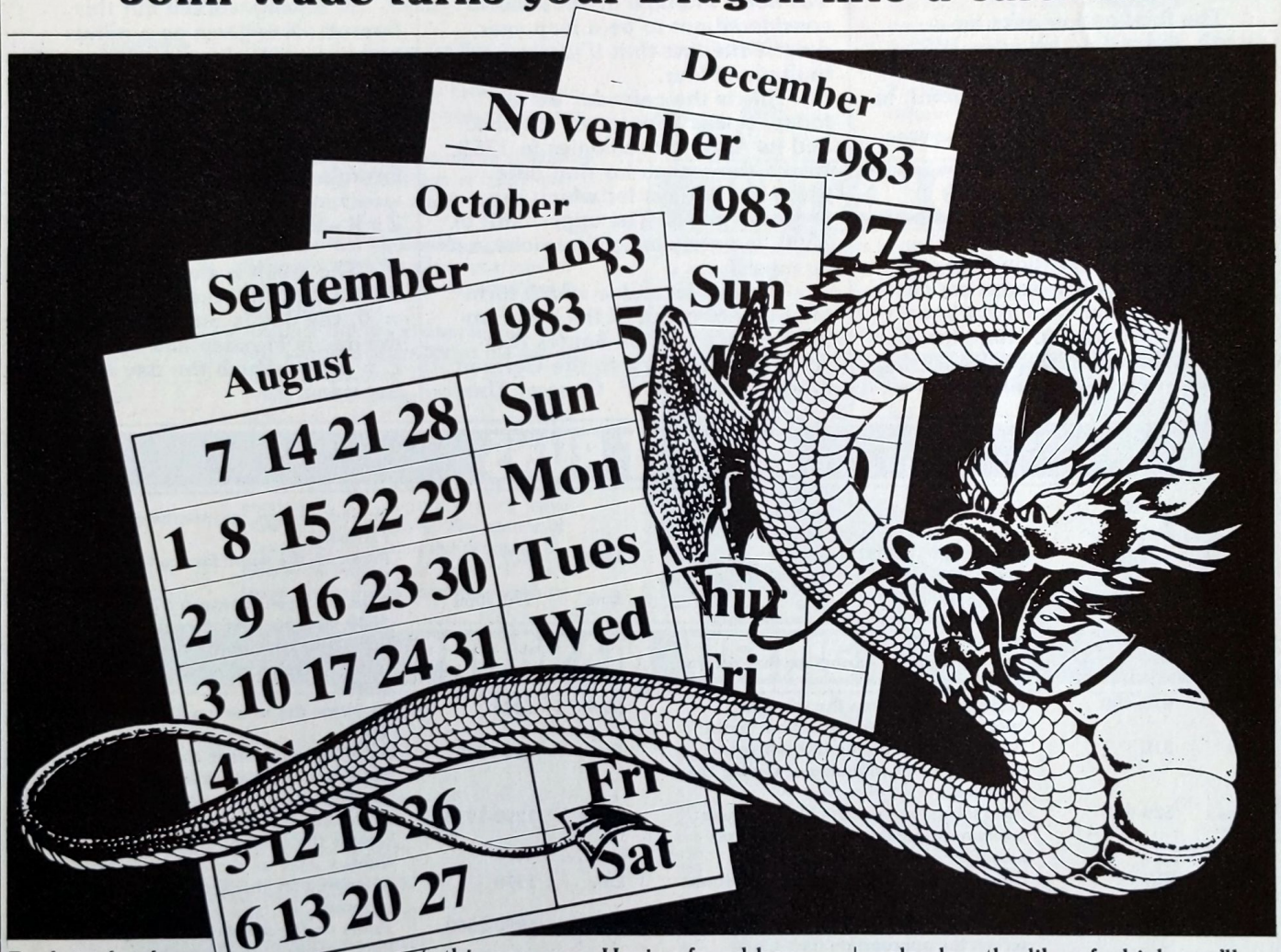
SOFTWARE

DAYS OF THE DRAGON

John Wade turns your Dragon into a calendar.



Back in the days of the Music Hall, there was a man whose act, he claimed, was based on fabulous feats of memory. Give him your birthdate and he would tell you its day of the week.

In fact, the act was based more on maths than memory, and the artist's ability to mentally apply a couple of complex formulae.

It was the discovery of those formulae in a book of mathematics that prompted me to start writing this program. Having found how fascinated friends became when I spent a couple of minutes working out the appropriate day with the help of a pocket calculator, I decided to transfer the whole thing to my Dragon 32. What had previously taken minutes to perform, the micro took care of in a fraction of a second.

Having successfully made the program RUN, I began to see other possibilities for extending the idea to produce a complete calendar, the like of which you'll never see hanging on a wall. For a start, it spans well over 700 years!

When the program is RUN, you are first provided with a menu of seven options.

The first asks you to supply a month and then tells you how many days it contains. (If you give 'February' as your choice, it will also ask you which year you have in mind and then adjusts for leap years.)

The second asks for any date ▶

DAYS OF THE DRAGON

between 1752 and 2500 and then tells you whether or not your choice is a leap year.

The third asks for two dates in the same year and then tells you how many days there are between them.

The fourth asks a similar question and gives its answer in weeks.

The fifth asks for your birthdate and tells you its day of the week.

The sixth asks for *any* date between 1752 and 2500 and replies with its appropriate day of the week.

The final option asks for a month and a date between 1752 and 2500 and then prints a complete calendar for the month in question.

The Background

Before looking in detail at how the program RUNs, a little background information is in order. The basis for the calendar we use today is reckoned to have its roots in Ancient Rome and Romulus, the city's mythical founder. His calendar had ten months, each of thirty days. Soon after, it was modified by the addition of an extra two months, but it wasn't until Julius Caesar got to grips with the problem that the basis for today's version began to take shape. It was he who added an extra day every four years in a year that was also a multiple of four, and so gave us the leap year.

That was a system that was in use util 1582 when Pope Gregory XIII introduced the Gregorian calendar. It resembled Caesar's, but with one exception. Any century that began with a year that was *not* a multiple of 400, was considered not to be a leap year, despite the fact that it *was* a multiple of four.

This is the calendar we use today. It was adopted by England and its American colonies in 1752. Hence the reason for that date being the earliest for which this program works. The upper limit of 2500, is purely an arbitary one, set by myself.

The two formulae which form the basis of much of the program have been based on figures that can be traced back to the German mathematician C.F. Gausse. The first formula is this:

$$X = INT((2.6xM) - 0.2 + D + Y + INT(Y \div 4) + INT(C \div 4) - /2xC))$$

In this, M represents the month, according to the figuration March = 1, April = 2, and so on up to December = 10. January = 11 and February = 12, but they are considered as months of the *previous* year. D represents the day in the month, Y represents the last two digits of the year and C represents the first two digits of the year.

If, having worked out this formula, X is given as a minus number, multiples of seven are added until it becomes positive. No more than eight multiples ever need to be added. Having found a positive value for X, the second formula is applied. Here it is:

$$Z = X - (7xINT(X \div 7))$$

The result is then applied to the days of the week in which, if Z = 0, the day is Sunday, if Z = 1, the day is Monday and so on up to Z = 6, for which the day is Saturday.

HOW IT RUNS

Lines	10-260	Sets up the menu of options available, names variables used throughout the program and branches to the appropriate lines, depending on the option chosen.
Lines	270-390	Asks for your birthdate and accepts your answers.
Line	400	Branches to the subroutine that returns the day number.
Lines	410-490	Prints on the screen the relevant information on the day of your birth.
Line	510	Branches to a routine that offers you the chance of continuing or ending the program.
Lines	520-650	Asks for a date for which you require an appropriate day and accepts your answers.
Line	660	Branches to the subroutine that returns the day number.
Lines	680-780	Names variables and prints on the screen the appropriate day. Lines 680-700 must be updated according to the current year.
Line	800	Performs the same function as line 510.
Lines	810-880	Asks for information on months for which you require the number of days and accepts your answers.
Lines	890	Branches to line 950 for any months other than February.
Lines	900-930	Allows for leap years and prints on the screen the appropriate number of days for February.
Line	940	Performs the same function as line 510.
Line	950	Prints on the screen the appropriate number of days for months other than February.
Line	970	Performs the same function as line 510.
Line	990-1060	Asks for a year between 1752 and 2500, accepts your answer, calculates if the year concerned is a leap year and prints the relevant information on the screen.
Line	1080	Performs the same function as line 510.
Lines	110-1270	Asks for two dates in the same year, accepts your answers and makes allowances for leap years.
Lines	1290-1950	Compares the two dates given and returns the number of days between them.
Line	1970	Is ignored for this section of the program.
Lines	1990-2000	Prints on the screen the number of days between the given dates.
Line	2020	Performs the same function as line 510.
Lines	2040-2070	Asks for two dates in the same year in preparation for working out the number of weeks between them.
Line	2080	Branches to line 1150 where, after accepting two dates, the number of days between the dates are returned as in the previous part of the program. This time, however, when line 1970 is reached, the program branches to line 2090.
Lines	2090-2200	Prints on the screen the number of weeks between the given dates by dividing the number of days by seven

		and returning the integer.
Line	2130	Performs the same function as line 510.
Lines	2150-2240	Asks for a month and a year and accepts the appropriate answers. Gives the date as the first of the chosen month.
Line	2250	Branches to the subroutine that returns the day number.
Line	2260	Prints on the screen the month and year that has been chosen.
Lines	2280-2340	Prints on the screen the days of the week for the calendar. If the subroutine has returned the first of the month as Sunday (Z = 0), the line of days is printed, beginning with that day. If the first of the month is Monday (Z = 1), then the line is printed, beginning with *that* day, and so on through the week.
Lines	2350-2380	Prints on the screen the first twenty-eight days common to all months. There are three spaces between single-digit numbers and two spaces between two-digit numbers.
Line	2390	Branches to the command that finishes the calendar with thirty or thirty-one days if the chosen month is *not* February.
Line	2400	Assumes that the chosen month *is* February, tests for a leap year and, if the chosen year is not so, branches to line 2440.
Line	2410	Assumes that the chosen month *is* a leap year and prints '29' at the end of the calendar.
Line	2420	Prints on the screen '29 30' at the end of the calendar if the chosen month is April, June, September or November, otherwise prints, '29 30 31'.
Lines	2440-2520	Is the routine to which all the different sections of the program branch when their task is complete. The choice of continuing or ending the program is offered by typing 'yes' or 'no'. If 'yes' is input, the program branches back to the start; if 'no' is input, and 'end of program' message is printed on the screen and the program closes down.
Lines	2550-2880	Is the subroutine used by three sections of the program to return a number representing the day of the week on which a specific date falls.
Lines	2570-2680	Gives a numerical value to the chosen month.
Line	2690	Returns the first two digits of the chosen year.
Lines	2700-2780	Returns the last two digits of the chosen year.
Line	2790	Returns the *previous* year if the chosen month is January or February.
Line	2810	Is the first of the two formulae for finding the day of the week.
Lines	2830-2860	Adds multiples of seven, up to eight multiples, to any minus number so found until the value is positive.
Line	2870	Is the second of the two formulae needed, returning a numeric value for Z which indicates the day of the week.
Line	2880	Returns the subroutine to its appropriate line in the program.

HINTS ON CONVERSION

No commands peculiar to the Dragon are used in this program, so it should easily be translated to other computers that use the floating decimal point system. PRINT @ positions might change from micro to micro, but these should be easy to recalculate, bearing in mind that the Dragon uses a 32 x 16 screen.

PROGRAM LISTING

```
10    CLS
20    REM CALENDAR PROGRAM
30    PRINT "***THE COMPUTERISED CALENDAR****"
40    REM MENU
50    PRINT "DO YOU REQUIRE:-"
60    PRINT
70    PRINT "  1. THE DAYS IN A MONTH?"
80    PRINT "  2. INFORMATION ON LEAP YEARS?"
90    PRINT "  3. THE DAYS BETWEEN DATES?"
100   PRINT "  4. THE WEEKS BETWEEN DATES?"
110   PRINT "  5. THE DAY OF YOUR BIRTH?"
120   PRINT "  6. THE DAY OF ANY OTHER DATE?"
130   PRINT "  7. CALENDAR PRINT OUT?"
140   PRINT@419,"SELECT ONE AND PRESS ENTER"
150   REM NAMING VARIABLES
160   JA$="JANUARY":FE$="FEBRUARY":MA$="MARCH"
      :AP$="APRIL":MY$="MAY": JU$="JUNE":JL$="JULY":AU$="AUGUST":
      SE$="SEPTEMBER": OC$="OCTOBER": NO$="NOVEMBER":DE$="DECEMBER"
170   SU$="SUNDAY":MO$="MONDAY":TU$="TUESDAY":WE$="WEDNESDAY":
      TH$="THURSDAY":FR$="FRIDAY":SA$="SATURDAY"
180   INPUT K
190   CLS
200   REM BRANCHES FOR EACH OPTION
210   IF K=1 THEN810
220   IF K=2 THEN990
230   IF K=3 THEN1090
240   IF K=4 THEN2040
250   IF K=6 THEN520
260   IF K=7 THEN 2150
270   REM BIRTHDATE STARTS
280   PRINT@69,"TELL ME YOUR BIRTHDATE"
290   PRINT@101,"AND I WILL TELL YOU THE"
300   PRINT@135,"DAY OF THE WEEK ON"
310   PRINT@169,"WHICH IT FELL"
320   PRINT@226,"PRESS ENTER AFTER EACH REPLY"
330   PRINT
340   PRINT "WHAT YEAR WERE YOU BORN?"
350   INPUT A
360   PRINT "WHAT WAS THE MONTH?"
370   INPUT M$
380   PRINT "WHAT DATE IN THE MONTH?"
390   INPUT D
400   GOSUB 2550
410   B$="YOU WERE BORN ON A "
420   REM DAYS DISPLAYED
430   IF Z=0 THEN PRINT@67, B$;SU$
440   IF Z=1 THEN PRINT@67, B$;MO$
450   IF Z=2 THEN PRINT@67, B$;TU$
460   IF Z=3 THEN PRINT@67, B$;WE$
470   IF Z=4 THEN PRINT@67, B$;TH$
480   IF Z=5 THEN PRINT@67, B$;FR$
490   IF Z=6 THEN PRINT@67, B$;SA$
500   REM BIRTHDATE ENDS
510   GOTO 2440
520   CLS
530   REM DAY/DATES STARTS
540   PRINT@68,"GIVE ME ANY DATE BETWEEN"
550   PRINT@103,"1752 AND 2500 AND"
560   PRINT@132,"I WILL TELL YOU ITS DAY"
570   PRINT@170,"OF THE WEEK"
580   PRINT@226,"PRESS ENTER AFTER EACH REPLY"
590   PRINT
600   PRINT "WHAT YEAR HAVE YOU CHOSEN?"
610   INPUT A
620   PRINT "WHAT MONTH?"
630   INPUT M$
640   PRINT "WHAT DATE IN THE MONTH?"
650   INPUT D
660   GOSUB 2550
670   REM UPDATE CURRENT YEAR
680   IF A<1983 THEN P$="WAS A"
690   IF A=1983 THEN P$="IS A"
700   IF A>1983 THEN P$="WILL BE A"
710   PRINT@67,·M$;D;A;P$
720   IF Z=0 THEN PRINT@99,SU$
730   IF Z=1 THEN PRINT@99,MO$
```

DAYS OF THE DRAGON

```
740   IF Z=2 THEN PRINT@99,TU$
750   IF Z=3 THEN PRINT@99,WE$
760   IF Z=4 THEN PRINT@99,TH$
770   IF Z=5 THEN PRINT@99,FR$
780   IF Z=6 THEN PRINT@99,SA$
790   REM DAY/DATES ENDS
800   GOTO 2440
810   CLS
820   REM DAYS IN MONTH STARTS
830   PRINT@70,"GIVE ME A MONTH AND"
840   PRINT@104,"I WILL TELL YOU"
850   PRINT@135,"ITS NUMBER OF DAYS"
860   PRINT@194,"PRESS ENTER AFTER YOUR REPLY"
870   PRINT@258,"WHAT MONTH HAVE YOU CHOSEN?"
880   INPUT G$
890   IF G$<>FE$ THEN CLS:GOTO 950
900   PRINT "WHAT YEAR?"
910   INPUT H
920   CLS
930   IF H/4=INT(H/4) AND H<>1800 AND H<>1900 THEN PRINT@67,
      "THAT MONTH HAS 29 DAYS"ELSE PRINT@67,"THAT MONTH HAS 28 DAYS"
940   GOTO 2440
950   IF G$=AP$ORG$=JU$ORG$=SE$ORG$=NO$THEN PRINT@67,"THAT MONTH HAS
      30 DAYS"ELSE PRINT@67,"THAT MONTH HAS 31 DAYS"
960   REM DAYS IN MONTH ENDS
970   GOTO 2440
980   REM LEAP YEAR STARTS
990   PRINT@71,"TELL ME A YEAR AND"
1000  PRINT@102,"I WILL TELL YOU IF IT"
1010  PRINT@134,"IS A LEAP YEAR OR NOT"
1020  PRINT@194,"PRESS ENTER AFTER YOUR REPLY"
1030  PRINT@320,"WHAT YEAR HAVE YOU CHOSEN?"
1040  INPUT L
1050  CLS
1060  IF L/4=INT(L/4) AND L<>1800 AND L<>1900 THEN PRINT@67,"THAT YEAR
      IS A LEAP YEAR"ELSE PRINT@67,"THAT YEAR IS NOT A LEAP YEAR"
1070  REM LEAP YEAR ENDS
1080  GOTO 2440
1090  CLS
1100  REM DAYS BETWEEN STARTS
1110  PRINT@36,"GIVE ME TWO DATES IN THE"
1120  PRINT@68,"SAME YEAR AND I WILL TELL"
1130  PRINT@101,"YOU THE NUMBER OF DAYS"
1140  PRINT@138,"BETWEEN THEM"
1150  PRINT@194,"PRESS ENTER AFTER EACH REPLY"
1160  PRINT@288,"WHAT IS THE YEAR?";
1170  INPUT T
1180  REM ALLOWANCE FOR LEAP YEAR
1190  IF T/4=INT(T/4) AND T<>1800 AND T<>1900 THEN V=29 ELSE V=28
1200  PRINT "FIRST MONTH?";
1210  INPUT FM$
1220  PRINT "WHAT DATE?";
1230  INPUT FD
1240  PRINT "SECOND MONTH?";
1250  INPUT SM$
1260  PRINT "WHAT DATE?";
1270  INPUT SD
1280  REM FORMULAE FOR DAY NUMBER
1290  IF FM$=SM$ THEN Q=SD-FD
1300  IF FM$=JA$ AND SM$=FE$ THEN Q=(31-FD)+SD
1310  IF FM$=JA$ AND SM$=MA$ THEN Q=(31-FD)+V+SD
1320  IF FM$=JA$ AND SM$=AP$ THEN Q=(31-FD)+V+31+SD
1330  IF FM$=JA$ AND SM$=MY$ THEN Q=(31-FD)+V+61+SD
1340  IF FM$=JA$ AND SM$=JU$ THEN Q=(31-FD)+V+92+SD
1350  IF FM$=JA$ AND SM$=JL$ THEN Q=(31-FD)+V+122+SD
1360  IF FM$=JA$ AND SM$=AU$ THEN Q=(31-FD)+V+153+SD
1370  IF FM$=JA$ AND SM$=SE$ THEN Q=(31-FD)+V+184+SD
1380  IF FM$=JA$ AND SM$=OC$ THEN Q=(31-FD)+V+214+SD
1390  IF FM$=JA$ AND SM$=NO$ THEN Q=(31-FD)+V+245+SD
1400  IF FM$=JA$ AND SM$=DE$ THEN Q=(31-FD)+V+275+SD
1410  IF FM$=FE$ AND SM$=MA$ THEN Q=(V-FD)+SD
1420  IF FM$=FE$ AND SM$=AP$ THEN Q=(V-FD)+31+SD
1430  IF FM$=FE$ AND SM$=MY$ THEN Q=(V-FD)+61+SD
1440  IF FM$=FE$ AND SM$=JU$ THEN Q=(V-FD)+92+SD
1450  IF FM$=FE$ AND SM$=JL$ THEN Q=(V-FD)+122+SD
1460  IF FM$=FE$ AND SM$=AU$ THEN Q=(V-FD)+153+SD
1470  IF FM$=FE$ AND SM$=SE$ THEN Q=(V-FD)+184+SD
1480  IF FM$=FE$ AND SM$=OC$ THEN Q=(V-FD)+214+SD
1490  IF FM$=FE$ AND SM$=NO$ THEN Q=(V-FD)+245+SD
1500  IF FM$=FE$ AND SM$=DE$ THEN Q=(V-FD)+275+SD
1510  IF FM$=MA$ AND SM$=AP$ THEN Q=(31-FD)+SD
1520  IF FM$=MA$ AND SM$=MY$ THEN Q=(31-FD)+30+SD
1530  IF FM$=MA$ AND SM$=JU$ THEN Q=(31-FD)+61+SD
1540  IF FM$=MA$ AND SM$=JL$ THEN Q=(31-FD)+91+SD
1550  IF FM$=MA$ AND SM$=AU$ THEN Q=(31-FD)+122+SD
1560  IF FM$=MA$ AND SM$=SE$ THEN Q=(31-FD)+153+SD
1570  IF FM$=MA$ AND SM$=OC$ THEN Q=(31-FD)+183+SD
1580  IF FM$=MA$ AND SM$=NO$ THEN Q=(31-FD)+214+SD
1590  IF FM$=MA$ AND SM$=DE$ THEN Q=(31-FD)+244+SD
1600  IF FM$=AP$ AND SM$=MY$ THEN Q=(30-FD)+SD
1610  IF FM$=AP$ AND SM$=JU$ THEN Q=(30-FD)+31+SD
1620  IF FM$=AP$ AND SM$=JL$ THEN Q=(30-FD)+61+SD
1630  IF FM$=AP$ AND SM$=AU$ THEN Q=(30-FD)+92+SD
1640  IF FM$=AP$ AND SM$=SE$ THEN Q=(30-FD)+122+SD
1650  IF FM$=AP$ AND SM$=OC$ THEN Q=(30-FD)+152+SD
1660  IF FM$=AP$ AND SM$=NO$ THEN Q=(30-FD)+183+SD
1670  IF FM$=AP$ AND SM$=DE$ THEN Q=(30-FD)+213+SD
1680  IF FM$=MY$ AND SM$=JU$ THEN Q=(31-FD)+SD
1690  IF FM$=MY$ AND SM$=JL$ THEN Q=(31-FD)+30+SD
1700  IF FM$=MY$ AND SM$=AU$ THEN Q=(31-FD)+61+SD
1710  IF FM$=MY$ AND SM$=SE$ THEN Q=(31-FD)+92+SD
1720  IF FM$=MY$ AND SM$=OC$ THEN Q=(31-FD)+122+SD
1730  IF FM$=MY$ AND SM$=NO$ THEN Q=(31-FD)+153+SD
1740  IF FM$=MY$ AND SM$=DE$ THEN Q=(31-FD)+183+SD
1750  IF FM$=JU$ AND SM$=JL$ THEN Q=(30-FD)+SD
1760  IF FM$=JU$ AND SM$=AU$ THEN Q=(30-FD)+31+SD
1770  IF FM$=JU$ AND SM$=SE$ THEN Q=(30-FD)+62+SD
1780  IF FM$=JU$ AND SM$=OC$ THEN Q=(30-FD)+92+SD
1790  IF FM$=JU$ AND SM$=NO$ THEN Q=(30-FD)+123+SD
1800  IF FM$=JU$ AND SM$=DE$ THEN Q=(30-FD)+153+SD
1810  IF FM$=JL$ AND SM$=AU$ THEN Q=(31-FD)+SD
1820  IF FM$=JL$ AND SM$=SE$ THEN Q=(31-FD)+31+SD
1830  IF FM$=JL$ AND SM$=OC$ THEN Q=(31-FD)+61+SD
1840  IF FM$=JL$ AND SM$=NO$ THEN Q=(31-FD)+92+SD
1850  IF FM$=JL$ AND SM$=DE$ THEN Q=(31-FD)+122+SD
1860  IF FM$=AU$ AND SM$=SE$ THEN Q=(31-FD)+SD
1870  IF FM$=AU$ AND SM$=OC$ THEN Q=(31-FD)+30+SD
1880  IF FM$=AU$ AND SM$=NO$ THEN Q=(31-FD)+61+SD
1890  If FM$=AU$ AND SM$=DE$ THEN Q=(31-FD)+91+SD
1900  IF FM$=SE$ AND SM$=OC$ THEN Q=(30-FD)+SD
1910  IF FM$=SE$ AND SM$=NO$ THEN Q=(30-FD)+31+SD
1920  IF FM$=SE$ AND SM$=DE$ THEN Q=(30-FD)+61+SD
1930  IF FM$=OC$ AND SM$=NO$ THEN Q=(31-FD)+SD
1940  IF FM$=OC$ AND SM$=DE$ THEN Q=(31-FD)+30+SD
1950  IF FM$=NO$ AND SM$=DE$ THEN Q=(30-FD)+SD
1960  REM BRANCH FOR WEEKS
1970  IF K=4 THEN2090
1980  CLS
1990  PRINT@67,"THERE ARE ";Q;"DAYS"
2000  PRINT@99,"BETWEEN THOSE DATES"
2010  REM DAYS BETWEEN ENDS
2020  GOTO 2440
2030  REM WEEKS BETWEEN STARTS
2040  PRINT@36,"GIVE ME TWO DATES IN THE"
2050  PRINT@68,"SAME YEAR AND I WILL TELL"
2060  PRINT@101,"YOU THE NUMBER OF WEEKS"
2070  PRINT@138,"BETWEEN THEM"
2080  GOTO 1150
2090  CLS
2100  PRINT@67,"THERE ARE ";INT(Q/7);" WEEKS"
2200  PRINT@99,"BETWEEN THOSE DATES"
2120  REM WEEKS BETWEEN ENDS
2130  GOTO 2440
2140  REM CALENDAR STARTS
2150  PRINT@69,"CHOOSE A MONTH BETWEEN"
2160  PRINT@103,"1752 AND 2500 AND"
2170  PRINT@132,"I WILL PRINT ITS CALENDAR"
2180  PRINT@194,"PRESS ENTER AFTER EACH REPLY"
2190  PRINT
2200  PRINT"WHAT YEAR HAVE YOU CHOSEN?"
2210  INPUT A
2220  PRINT"WHAT MONTH?"
2230  INPUT M$
2240  D=1
2250  GOSUB 2550
2260  PRINT@34,M$;A
2270  REM CALENDAR PRINT OUT
2280  IF Z=0 THEN PRINT@130,"SUN MON TUE WED THU FRI SAT"
2290  IF Z=1 THEN PRINT@130,"MON TUE WED THU FRI SAT SUN"
2300  IF Z=2 THEN PRINT@130,"TUE WED THU FRI SAT SUN MON"
2310  IF Z=3 THEN PRINT@130,"WED THU FRI SAT SUN MON TUE"
2320  IF Z=4 THEN PRINT@130,"THU FRI SAT SUN MON TUE WED"
2330  IF Z=5 THEN PRINT@130,"FRI SAT SUN MON TUE WED THU"
2340  IF Z=6 THEN PRINT@130,"SAT SUN MON TUE WED THU FRI"
2350  PRINT"   1   2   3   4   5   6   7"
2360  PRINT"   8   9  10  11  12  13  14"
2370  PRINT"  15  16  17  18  19  20  21"
2380  PRINT"  22  23  24  25  26  27  28"
2390  IF M$<>FE$ THEN 2420
2400  IF A/4<>INT(A/4) OR A=1800 OR A=1900
      THEN 2440
2410  PRINT"  29":GOTO 2440
2420  IF M$=AP$ OR M$=JU$ OR M$=SE$ OR M$=NO$ THEN
      PRINT"  29  30" ELSE PRINT"  29  30  31"
2430  REM RETURN TO MENU
2440  PRINT@354,"DO YOU REQUIRE FURTHER"
2450  PRINT@386,"INFORMATION? TYPE 'YES'
2460  PRINT@418,"OR 'NO' AND PRESS ENTER"
2470  INPUT K$
2480  IF K$="YES" THEN 10
2490  CLS
2500  PRINT@233,"END OF PROGRAM"
2510  PRINT@267,"THANK YOU"
2520  GOTO 2520
2530  REM SUBROUTINE TO
2540  REM CALCULATE DAYS
2550  CLS
2560  REM IDENTIFY MONTHS
2570  IF M$=MA$ THEN M=1
2580  IF M$=AP$ THEN M=2
2590  IF M$=MY$ THEN M=3
2600  IF M$=JU$ THEN M=4
2610  IF M$=JL$ THEN M=5
2620  IF M$=AU$ THEN M=6
2630  IF M$=SE$ THEN M=7
2640  IF M$=OC$ THEN M=8
2650  IF M$=NO$ THEN M=9
2660  IF M$=DE$ THEN M=10
2670  IF M$=JA$ THEN M=11
2680  IF M$=FE$ THEN M=12
2690  C=INT(A/100)
2700  IF A>1751 AND A<1800 THEN Y=A-1700
2710  IF A>1799 AND A<1900 THEN Y=A-1800
2720  IF A>1899 AND A<2000 THEN Y=A-1900
2730  IF A>1999 AND A<2100 THEN Y=A-2000
2740  IF A>2099 AND A<2200 THEN Y=A-2100
2750  IF A>2199 AND A<2300 THEN Y=A-2200
2760  IF A>2299 AND A<2400 THEN Y=A-2300
2770  IF A>2399 AND A<2500 THEN Y=A-2400
2780  IF A=2500 THEN Y=0
2790  IF M=11 OR M=12 THEN Y=Y-1
2800  REM FORMULAE FOR DAYS
2810  X=INT((2.6*M)-.2+D+Y+INT(Y/4)+INT(C/4)-(2*C))
2820  REM ADJUST FOR MINUS NUMBER
2830  FOR G=7TO56STEP7
2840  IF X<0 THEN X=X+G
2850  IF X>0 THEN 2870
2860  NEXT G
2870  Z=X-(7*INT(X/7))
2880  RETURN
```

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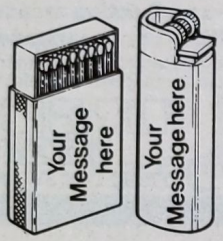

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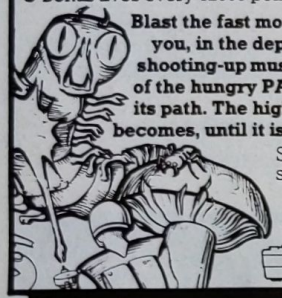

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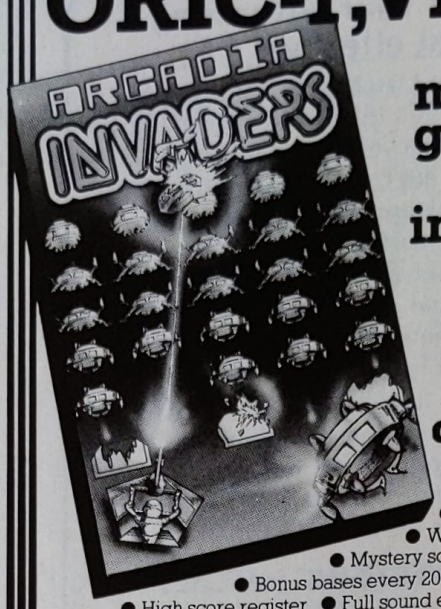

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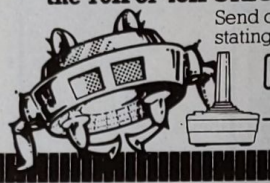

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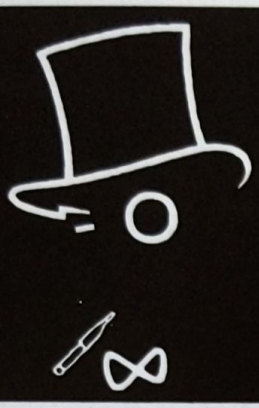

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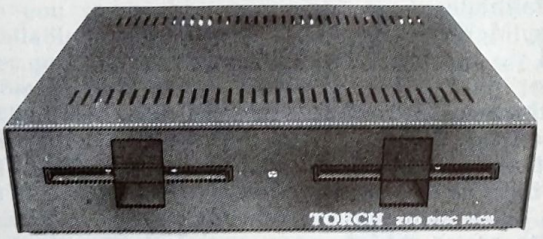

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TECHNICAL ENQUIRIES

MICROANSWERS is Personal Computing Today's Technical Enquiries Service. Each month we will endeavour to answer your questions on the subject of micro-computing. We would love to hear of your problems (honest!) as it is certain that if you are having trouble then other users of your machine will also be suffering.

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Dear PCT
I have just purchased a BBC Micro, Model B and because I only had a ZX81 at the time of the program 'Making the most of the Micro' I didn't take much notice. Please could you tell me if the BBC are going to repeat the series, or if not, where I can purchase the books that accompanied it.
Also, please could you tell me which are the best books for learning BBC Basic.
Well done for a great magazine.
Yours faithfully
Anthony McKay
Kendal

As is the way with all things BBC, the 'Making the most of the Micro' series will be repeated. The repeat showing of this series is scheduled for some time in October, so keep an eye open in the Radio Times for further details.
The literature which accompanied the program comes from the BBC's Computer Literacy Project. This can still be obtained from the following address: P.O. Box 7, London W3 6XJ.
Also being launched around October is a book containing a lot of the software seen in the television series. The book has been written by Ian Trackman and Henry Budgett both of whom worked on the program. The book contains the programs in listing form and is accompanied by two cassette tapes which contain the programs ready to be loaded into the computer. As of yet the price is uncertain but it is likely to be in the £10-£20 range.
Granada have a series of books which include an introduction to the BBC Micro and it would be worth your while checking this out as a fairly unpresumptive introduction to the computer.

Dear PCT
At the end of February I bought a Dragon 32 microcomputer. At first everything went fine until I got to the stage of writing programs which use joystick control.
The first (and minor) snag is in the manual which states that joystick (0) & (1) control the left stick and joystick (2) & (3) control the right, when in fact it is the other way around.
However, the major problem arose from my inability to get any left joystick reaction whatsoever when running a program! If the joystick commands were entered via the keyboard or cassette then the right joystick would work but not the left. Combining joystick (0) + (2) or (0) + (3) split the responses between the joysticks but (1) + (2) or (1) + (3) did not.
Running the short program at the top of page 88 in the users manual gave the correct responses for all four values of the joysticks, but when used in a program, to manoeuver graphics, the left joystick froze at the last position.
The computer was returned to Dragon Data, with a full explanation. No acknowledgement was received and after several phone calls to check on the position (the "girl who dealt with this sort of thing" was never there by the way). A new computer was sent to my dealer.
This one, with a serial number 73,807 beyond the first (No. 016502 and 090309) had exactly the same fault. This was also returned to Dragon Data — once again no ackowledgement of receipt was sent — that was 21 days ago — a full explanation of the fault was once again sent to the firm explaining the snag but no reply to date has been received.
I have also phoned the technical department and was told "Oh yes! This is a known fault. You either have to enter joystick(0)&(1) before (2)&(3) or there's a problem with your cassette recorder!"Really!!
How can a faulty recorder
a)Affect programs entered via the keyboard.
b) Differentiate between the rest of the program and the joystick routines (and snarl them up)?
Entering joystick(0) + (1) before (2)&(3), (which had been tried — I'd tried everything —) didn't cure the problem!
Shouldn't something be done to cure known faults — there's no mention of this fault in the manual or the advertising either!!
Have you any ideas — apart from this snag the computer works very well and I am really pleased with it.
I can't say the same for the attitude of Dragon Data Ltd, surely their back-up service needs a good shake-up.
Yours faithfully
E.B. Little
Dyfed

I have talked to Dragon Data about this problem and they were most helpful. They admitted to the misprint which occurred in the early manuals, but they do not agree that the joystick problem you are having is a recognised fault.
I tried out the joysticks on our office Dragon and found that they worked perfectly! I used the following program to test them so I suggest you try it yourself.

```
5    PCLS
10   SCREEN 1,1:PMODE 1
```

```
20    GOSUB 1000
30    PSET(A,B,2)
40    PSET(C,D,3)
50    PRESET (A,B)
60    PRESET (C,D)
70    GOTO 20
1000 A=JOYSTCK(0)
1010 B=JOYSTCK(1)
1020 C=JOYSTCK(2)
1030 D=JOYSTCK(3)
1040 RETURN
```

One other interesting fact which I learnt from the technical people at Dragon Data is that for all joystick operations, JOYSTICK(0) has to be read first, because this primes the other registers with the values for the other joystick positions. This function can be simulated by using the EXECute command with a value 8012 hexadecimal.
If this fails I should take your joystick along to your dealer and try your program out on one of their machines. The mistake might even lie in the software you have written.

Dear PCT
HELP! I have a problem with my 48K Spectrum.
As a teacher I am trying to incorporate simple pictures and maps into programs that can be used by junior school children. For example, questions about the voyages of Captain Cook that could show a map at the appropriate time with the current position of Cook's ship.
I can draw maps and sketches with a simple 'sketch' program and save them onto tape using SAVE"map" SCREEN$. I can load them back onto the screen wioth LOAD"map" SCREEN$ but as soon as I try to do anything else — all is lost.
(a) How can I incorporate a map into a quiz type program?
(b) How can I incorporate a map with the voyages marked and have them progress as the children answer the questions correctly?
Yours sincerely
P.D. Fiddler
Solihull

I think the problem you are having with this program is that you are trying to load the SCREEN$ in direct mode. This means that on loading, any other key pressed will result in the screen being cleared. The answer to this is to use the LOAD command from within a program.
You will have to design your map and general screen format carefully to allow space for the questions to be printed and the answers to be inputted and save it as a SCREEN$. It should then be simply be a case of overlaying further information using the PRINT as AT, PLOT and DRAW statements in response to the answer.
So basically, what you must write is the program which will set the problems and analyse the answers. At the beginning of the program you should have a line which loads in the SCREEN$ e.g. 10 LOAD "map" SCREEN$
Once this has loaded you can draw over it using the commands in the Spectrum. It should also be possible to have a series of screens already prepared on tape and then have the program load them sequentially, to illustrate various aspects of the tutorial.
Unfortunately space does not permit me to go into any further detail, but I hope I have solved the problem of loading screens into your computer.

Dear PCT
As a complete novice in computer matters, I am considering purchasing a 48K Spectrum as both price and capabilities seem about right.
However, I have been advised that micros using a 16bit processor are in the course of development, which will be more powerful and may be cheaper. I am told the Japanese are involved.
Do you think that any such new machines will be available, say within the next 12 months and if so will they quickly make the present models obsolete? Are they liable to be cheaper than the present 'top 10' range (£40-£100). In short, should I buy now or wait?
Yours faithfully
B.D. McDougall

Yes there are 16 bit micros being developed and yes, the Japanese are involved, but I wouldn't hold your breath. There is a speed and memory addressing advantage with a 16 bit micro, but at the moment this is being employed mostly in machines for business use. In fact I only know of two 16 bit machines that are currently available for the home market and these are the Texas TI 99/4a and the Powertran Cortex.
In short, 16 bit micro's will find their way into the home but they are unlikely to be cheaper and they will certainly not have the software support to start off with.
For the moment, 8 bit rules the home, so buy now.

PRIORITY REPLY
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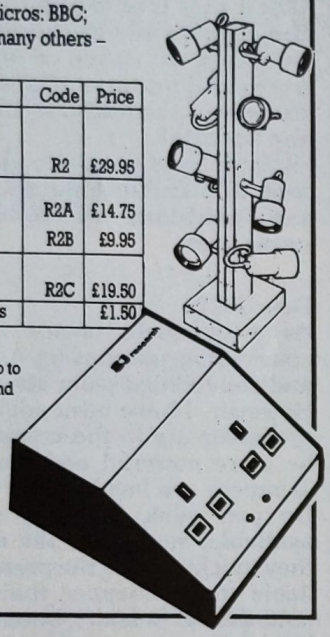

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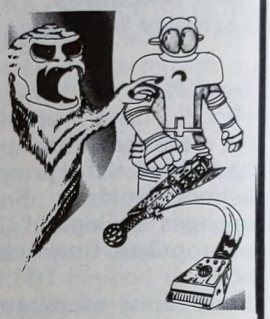

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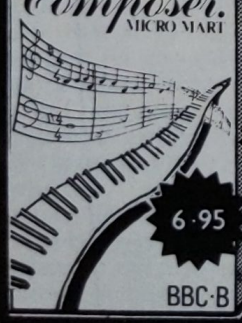

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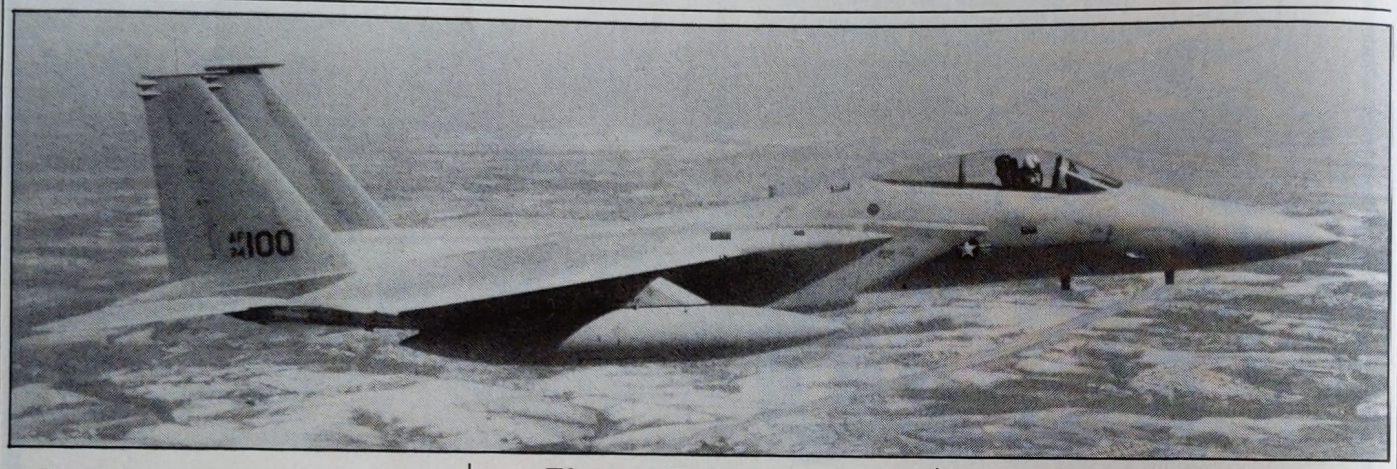
VIC 20

SOFTWARE

SCRAMBLE

Climb into the cockpit of your jet fighter craft and blast any enemy daring to cross your path. Stephen Knight provides the program.



Take the controls of your space-fighter and prepare yourself for a mission deep into the heart of enemy territory.

This version of scramble for the VIC contains most of the elements of the original arcade version. It has been written to run in a VIC with 3K of extra memory. Control is by either joystick or keyboard.

In the first part of the game you fly over terrain which contains rockets and fuel dumps. Destroying the rockets gains you points. Destroying the fuel dumps helps replenish your ever-dwindling fuel supply.

Flying High

As you penetrate further into the game you will start to encounter barrage balloons and enemy fighters. These can also be destroyed, gaining you extra points. Finally you will meet meteoroids which have to be avoided as your laser cannon is not powerful enough to destroy them.

One feature of this game that you will not find on any arcade version is the day and night runs. Out of every 130 seconds, 100 are light and 30 dark. During the night time you will not be able to see the fuel dumps, so make sure you have enough fuel to last the flight.

In order to get the screen scrolling from right to left I had to write a small machine code routine. This sits in the cassette buffer and is called by the SYS 829 command. When called it shifts everything on the screen one space to the left.

If you do not have a joystick you can use the keyboard to play the game. The controls are as follows: UP-A, DOWN-D, LEFT-:, RIGHT-=, FIRE-SPACE BAR. All of these keys have been set to repeat.

Ready? Well man the controls and take to the skies now.

HINTS ON CONVERSION

There are two main obstacles in converting this program to another machine.

The first is the need for a memory mapped screen. If your machine has one of these the conversion is fairly simple. Just insert the starting position of your screen in line 5 and also insert the dimensions of your screen in lines 180, 390, 410 etc. The provision of colour on the VIC is rather clumsy. It involves changing the colour of spaces rather than changing the colour of shapes and then POKEing them. This is illustrated in line 180 for example. I am sure you will be able to develop your own method of colour illustration.

The second major obstacle is the machine-code routine inputed at line 600 which resides in the tape buffer. If you have not found one of these as a subroutine in a program for your machine (how this one was found) then I fear you will have to write your own. This routine is vital as it is around this that the whole program is based.

Apart from these two problems I cannot see many obstacles to successful conversion. Obviously you will need a joystick control routine and a joystick, if you wish to use this part of the program. The sound is relatively unimportant although it does liven the game up a bit. The rest of the program is in fairly standard basic. However there are some POKE equivalents you will need. To help you with this here is a list of what the stranger POKES mean.

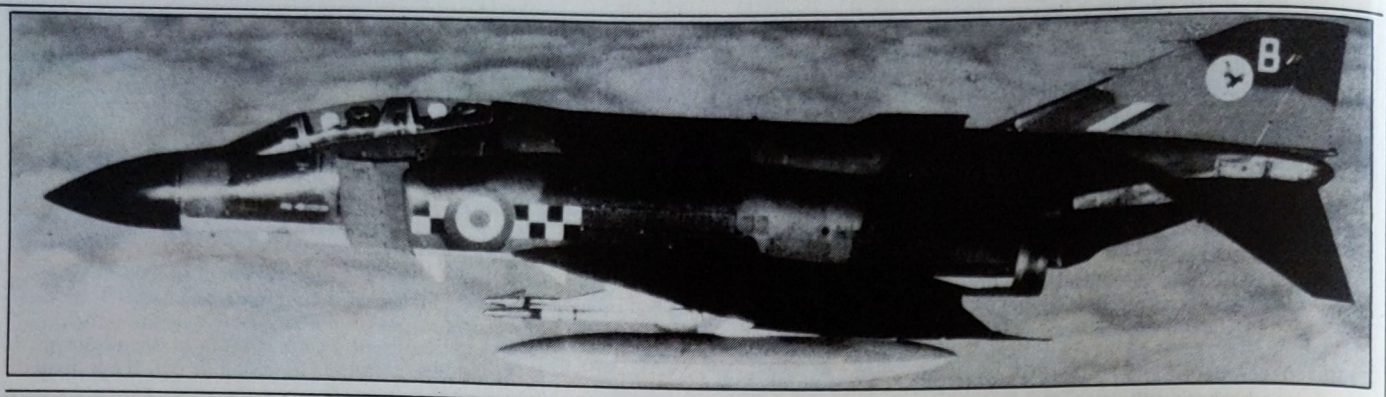
7680 — Start of memory mapped screen.
38400 — Start of colour map of screen.
36877 — One of the VIC's four tones.
36878 — VIC's volume control.
36879 — VIC's colour of border and screen definition location
198 — VIC's keyboard buffer location.
650 — VIC's keyboard repeat key.

HOW IT RUNS

5	Setmarker for position of start of memory map and for start of colour map.
7	GOSUB to read in the auto-scroll routine and set up defined characters.
10	Set all keys to auto-repeat. Change to 'POKE' 650,0' if not required.
20	GOSUB to initialisation routine
40	GOSUB to initialise the joystick control routine.
60	POKE flat terrain accross the screen ready for start of game.
130-160	Decide whether next block of terrain will rise or fall and check it's still within the limits set.
170	Set variables for POKEing block of terrain and for changing that block's colour.
180	POKE next block of terrain.
190	Checks that the terrain is not too high for a barrage balloon. If it is, jump round the next line.
200	Checks time and random number. If they are both favourable then POKES barrage balloon.
210	Checks random number. If it is favourable then POKE fuel tank.
220	Checks random number. If it is favourable then POKEs fuel tank.
230	If fuel tank is empty then shuts off controls and the descend ship.
240	If time is favourable then GOSUBs to routine to possibly set up enemy planes.
250	If the time is favourable then GOSUB to routine to possibly set up meteorites.
262-266	Set up and operate the continuous lightness/darkness routine.
270	If keyboard was selected earlier then GOTO the read routine for the keyboard instructions.
280-330	GOSUB to read in commands from the joystick then change position numbers which are used to locate your own ship when POKEing onto the screen.
340-370	Operate checks on your own ship's position numbers. If they have left the parameters set then change them back to the maximum.
380	POKE space into last position of ship to avoid leaving behind an image.
400	Goes into the machine-code routine read in in line 600. This moves everything on screen one square to the left.
410	POKES new position of your own ship on the screen.
420	Sets up variables to be used next time round (in line 280). This is to allow for the changing of P and O in lines 300-330 or 1550-1590.
430	Checks if missile is in the process of being fired. If so, it ensures that another one could not be fired by jumping over lines 440-450.
440-450	Depending on the method of control selected these check whether the fire indicator has been pressed. If so set variables to record where the ship was when the missile was fired so that it does not move with your own ship (this refers to the height).
460	If missile is in the process of moving or has just been fired then GOTO the missile detection and fire routine.
470	Work out present position of ship plus one.
490	Tests if A is filled by a missile which has just been fired. If so then jump next line.
500	Tests if A is occupied by anything other than a space. If so it is assumed that your craft will hit this obstacle next move and therefore jump to the crash routine.
520	Empties fuel tank by one.
550-570	Depending on whether your own ship is descending or climbing these change the volume to provide the fluctuating background noise.
580	POKE sound.
590	Goes back to the beginning of the main loop.
600	Reads machine-code routine then stores it in the tape buffer.
620-640	Data for line 600.
650	Beginning of missile firing and detection routine. Increments by one the store which keeps a track of how far the missile has gone so that the missile can be moved across the screen.
660	Works out the new position of missile based on the starting position plus how far the missile has gone already(Q).
670	POKE space into the old position of missile to avoid leaving an image on the screen.
680	POKEs up missile into new position on the screen.
690	Tests whether the missile has reached the limit of its range without hitting anything or not. If not jump over next line.
700	POKEs up explosion for short time then POKE space. This will only occur if the missile has not hit a target.
720	Works out number of the positions one and two squares ahead of the missile.
720-790	Check if the squares ahead of the missile are occupied (if they are then this is taken as the signal for a 'hit'). If so then take the appropriate action.
800	Sometimes if the correct shape is detected ahead of the missile the score will be increased. This line allows for the fact that the missile will have left an image on the screen behind any 'explosion' which was POKED. It POKES a space over this image. This job would normally be done by line 670 but as the missile is now said to have run its full course this line will not again be reached with these co-ordinates.
820	Start of crash routine. This line POKES the V seen on the screen for a short time immediate after a crash of your own ship.
830	Turns off background noise.
850-910	Display of performance seen on screen after crash.
920	Begins sound loop heard just after display is printed.
930	Checks if score is higher than top score. If so alter top score.
940-980	Complete sound loop.
990	Clears input buffer to ensure that no accidental inputs to line 1010 can occur.
1060	Input from line 1060 (if it is not K or J then return for new input.
1080	Return to start new game.
1100	Start missile explosion and score routine. This is the routine entered if any scoring item is detected in lines 720-790. This line POKES on the screen the explosion seen on the screen immediately after a missile 'hit'.
1110-1140	Sound routine heard immediately after a missile is hit.
1150-1180	Increment score and fuel by appropriate numbers. This section uses variables defined in lines 720-790.
1185	Return to missile fire and detection routine.
1200	Increments by appropriate number the store which provides a slowly increasing number of enemy fighters. If reached maximum then keep only at maximum.
1220	Ensure fighter plane will be above landscape by creating store two less than actual height of landscape to be used as height of landscape from now on.
1300	POKE enemy fighter and changes fighter's colour.
1260-1310	Using the same variable to provide slowly increasing numbers, POKE meteorites.
1320-1350	Read from joystick during control routine.
1360-1540	Initialisation routine. Includes selection of joystick or keyboard control.
1560-1600	Read from keyboard for keyboard control routine, then return to checks avoiding the joystick read-in section.
2000-2210	Set up user-defined graphics.
2600-2650	Set up joystick positions.

VIC 20

SCRAMBLE

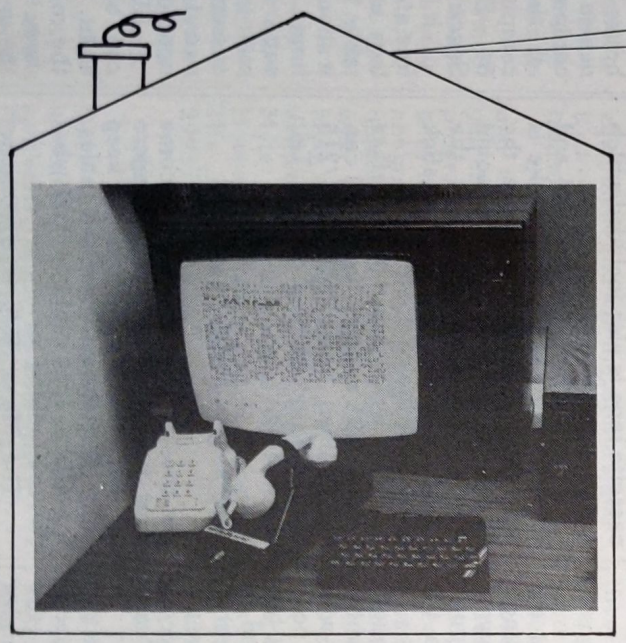


PROGRAM LISTING

```
1 REM *****BY******
2 REM * S. KNIGHT *
3 REM *21ST JAN 83*
4 REM *************
5 POKE52,24:POKE56,24:CLR:MA=7680:MB=38400
7 GOSUB600:GOSUB 2000
10 POKE650,128
20 GOSUB1360
40 GOSUB2600
50 PRINT"■":POKE36879,30
60 FORT=1TO22:POKEMA+21+(22*15),160:SYS829:NEXTT
70 F=15:SC=0
80 POKE36878,15
90 Y=15:P=10:O=10:0=11:S=36877:FU=120:TX=0:DR=.02
100 TI$="000000"
110 X=RND(0)
120 M=INT(RND(0)*100)
130 IFX>.7THENY=Y+1
140 IFX<.2THENY=Y-1
150 IFY<3THENY=3
160 IFY>18THENY=18
170 L=MA+21+(22*Y):L1=MB+21+(22*Y)
180 POKEL,160:POKEL1,2
185 POKEL+22,37:POKEL1+22,2
190 IFY<7THENGOTO210
200 IFT1$>"000020"THENIFM>40ANDM<50THENFORT=22TO44STEP22:POKEL-T,66:NEXTT:POKEL
66,83
210 IFM>85THENPOKEL-22,88:POKEL1-22,0
220 IFM<12THENPOKEL-22,30:POKEL1-22,6
230 IFFU<1THENP=P+1:FU=0:GOTO340
240 IFT1$>"000030"THENGOSUB1190
250 IFT1$>"000080"THENGOSUB1260
262 TX=TX+1
263 IFTX<99THENPOKE36879,30
264 IFTX>100THENPOKE36879,9
266 IFTX=130THENTX=0
270 IFCH$="K"THENGOTO1550
280 GOSUB1320

300 IFSO=-1THENP=P-1
310 IFS1=1THENP=P+1
320 IFS3=1THENO=O+1
330 IFS2=-1THENO=O-1
340 IFP<1THENP=1
350 IFO<0THENO=0
360 IFO>17THENO=17
370 IFP>21THENGOTO820
380 POKEMA+(P1*22)+01,32
390 PRINT"■ FUEL";FU;"■ SCORE";SC;"■ "
400 SYS829
410 POKEMA+(P*22)+O,62
420 O1=O:P1=P:
430 IFO<10THEN460
440 IFCH$="K"ANDA$=" "THENO=0:F=P:D=O
450 IFCH$="J"ANDFR=1THENO=0:F=P:D=O
460 IFO<10THENGOSUB650
470 A=PEEK(MA+(P*22)+O+1)
490 IFA=70THEN520
500 IFA<>32THENGOTO820
520 FU=FU-1
540 IFFU<0THENPOKES,240:GOTO110
550 IFA$="A"ORSO=-1THENPOKE36878,5:GOTO580
560 IFA$="D"ORS1=1THENPOKE36878,15:GOTO580
570 POKE36878,10
580 POKES,150
590 GOTO110
600 FORT=829TO874:READS:POKET,S:NEXTT:RETURN
620 DATA169,19,32,210,255,169,29,32,210,255,169,13,32,210,255,169,0,141,60,3
630 DATA169,29,32,210,255,169,20,32,210,255,169,13,32,210,255,238,60,3,173,60,3
640 DATA201,21,208,231,96
650 O=O+1
660 A=MA+(P*22)+D+O
670 POKEA-2,32
680 POKEA,70
690 IFO<10THENGOTO710
700 POKEA,42:FORT=1TO20:NEXTT:POKEA,32:RETURN
710 REM

720 Z=PEEK(A+1):Z1=PEEK(A+2):G=0
730 IFZ=88ORZ1=88THENG=1:O=10:GOSUB1100
740 IFZ=30ORZ1=30THENG=2:O=10:GOSUB1100
750 IFZ=60ORZ1=60THENG=3:O=10:GOSUB1100
760 IFZ=160ORZ1=160THENPOKEA,160:O=10
765 IFZ=0ORZ1=0THENO=10
770 IFZ=42ORZ1=42THENO=10
780 IFZ=66ORZ1=66THENPOKEA+1,42:O=10:POKEA+1,32
790 IFZ=83ORZ1=83THENG=4:GOSUB1100:O=10
800 IFO=10THENPOKEA,32
810 RETURN
820 POKEMA+(P*22)+O,42
830 POKES,0
840 FORT=1TO1000:NEXT
850 PRINT"■":POKE36879,27
860 PRINT"■■■■■■■I YOU CRASHED"
870 PRINT"■■SCORE WAS";SC
880 PRINT"■■PREVIOUS BEST";TS
890 IFFU<0THENFU=0
900 PRINT"■■FUEL WAS",FU
910 PRINT"■■TIME WAS ";TI$
920 FORT=250TO150STEP-1
930 IFSC>TSTHENTS=SC
940 FORTT=1TO3
950 POKES-TT,T
960 NEXTTT
970 NEXTT
980 POKES-1,0:POKES-2,0:POKES-3,0
990 POKE198,0
1000 PRINT"■AGAIN (Y/N)"
1010 GETA$:IFA$=""THEN1010
1020 IFA$="Y"THEN1050
'1030 IFA$="N"THENEND
1040 GOTO820
1050 PRINT"■■■■■KEYBOARD OR JOYSTICK"
1060 GETCH$
1070 IFCH$<>"K"ANDCH$<>"J"THEN1060
1080 GOTO50
1090 END
1100 POKEA+1,42:POKEA+2,42:POKES,0
1105 POKEA+1,32:POKEA+2,32
1110 FORT=200TO230
1120 POKES-3,T
1130 NEXTT
1140 POKES-3,0

1150 IFG=1THENFU=FU+30:SC=SC+10
1160 IFG=2THENSC=SC+20
1170 IFG=3THENSC=SC+50
1180 IFG=4THENSC=SC+5
1185 RETURN
1190 R=RND(0)
1200 DR=DR+.005:IFDR>.4THENDR=.4
1210 IFR>DRTHEN RETURN
1220 R=Y-2
1230 RP=INT(RND(0)*R):
1240 POKEMA+21+(22*RP),60:POKEMB+21+(22*RP),5
1250 RETURN
1260 M=RND(0)
1270 IFM>DRTHENRETURN
1280 M=Y-1
1290 MP=INT(RND(0)*M)
1300 POKEMA+21+(MP*22),0:POKEMB+21+(MP*22),4
1310 RETURN
1320 POKE DD,127:S3=-((PEEK(PB)AND128)=0):POKEDD,255
1330 PF=PEEK(PA):S1=-((PFAND8)=0):S2=((PFAND16)=0)
1340 SO=((PFAND4)=0)
1350 FR=-((PFAND32)=0):RETURN
1360 POKE36879,20
1370 PRINT"■■■■■■■■■■■■ SCRAMBLE "
1380 PRINT"■      BY S.KNIGHT     "
1400 POKE36878,15
1410 FORT=150TO250:POKE36876,T:NEXTT:POKE36876,0
1480 PRINT"■■ KEYBOARD OR JOYSTICK"
1490 GETCH$
1500 IFCH$<>"K"ANDCH$<>"J"THEN1490
1510 PRINT"■■■■HIT ANY KEY TO START"
1520 POKE198,0
1530 GETA$:IFA$=""THEN1530
1540 RETURN
1550 GETA$
1560 IFA$=":"THENO=O-1
1570 IFA$=" "THENO=O+1
1580 IFA$="A"THENP=P-1
1590 IFA$="D"THENP=P+1
1600 GOTO 340
2000 REM SET UP U.D.G.
2005 PRINT"■SETTING UP GRAPHICS - PLEASE WAIT"
2010 FORI=0 TO (93*8)
2020 POKE 6144+I,PEEK(32768+I)
2030 NEXT I

2040 POKE 36869,254
2050 FOR C=1 TO 11
2060 READ P
2070 FOR I=0 TO 7:READ A
2080 POKE 6144+(P*8)+I,A
2090 NEXT I,C
2100 DATA 30,24,24,60,60,60,60,90,153
2110 DATA 88,24,60,102,219,102,126,90,90
2120 DATA 83,0,0,0,0,0,49,126,254,113
2130 DATA 42,73,162,42,181,37,156,84,141
2140 DATA 62,0,0,0,128,192,252,255,252
2150 DATA 60,0,0,3,63,255,63,0,0
2160 DATA 0,0,0,53,123,253,123,0,0
2170 DATA 70,0,0,0,0,0,255,0,255
2180 DATA 160,16,88,253,255,255,255,255,255
2190 DATA 66,16,16,16,16,16,16,16,16
2200 DATA 37,255,255,255,255,255,255,255,255
2210 RETURN
2600 REM
2610 REM
2620 DIMJS(2,2):POKE37139,0:DD=37154:PA=37137:PB=37152
2630 FORI=0TO2:FORJ=0TO2:READJS(J,I):NEXTJ,I
2640 DATA -23,-22,-21,-1,0,1,21,22,23
2650 RETURN
```

ATTENTION! - all ZX81 (16K) and Spectrum (48K) users - get this, the . . .

Micro-Myte 60



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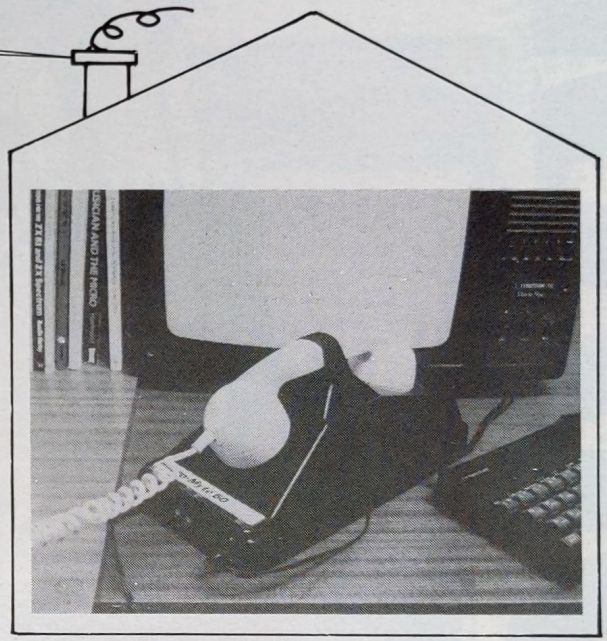

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.....

ADD ONS

Joystick Interface

Certainly the best way to get the most out of your games is by using a joystick. If you are an Oric owner you have a problem. The computer does not readily lend itself to the interfacing of joysticks.

PASE of Cheshire have brought out an interface for the Oric which allows two joysticks to be used with the computer via the printer port. The unit consists of a small grey box with a length of ribbon cable and an edge connector attached. On either side of the box is a male nine pin D-type connector. This will accept any joystick which uses the Atari-type connector.

The instructions which accompany the unit are very good. They give details of how the interface works and show examples of the software needed to drive it. A cassette tape is also included which contains two demo programs.

The interface worked well and the only criticism I could make is that they should have made the ribbon cable a bit longer. This would stop strain being put on the connector if you pulled the joystick away from the computer.

The Oric Joystick Interface costs £14.95 and further details can be obtained from PASE 213/215 Market Street, Hyde, Cheshire. Tel: 061 366 5935.

Micro Tidy

For those of you who have become tired of trying to balance your micro on your knees, or having to keep untangling the cat from the cables, the Micro Tidy could be just what you are looking for.

The Micro Tidy is a compact work desk which is designed to house all the equipment, tapes and manuals associated with a computer. It has been built to accept all the major makes of micro computer including VIC 20, CBM 64, BBC, Dragon and Sinclair Spectrum.

It is available in two versions — free standing or with a set of metal legs which will turn it into a full table. It is finished in wood veneer so it should not look out of place in any home. The Micro Tidy has a separate storage compartment built-in with slots to hold up to 16 cassette tapes. There is also storage provided for manuals and notebooks.

All the cables and connectors can be tidily stored away out of sight. The work table which houses the micro and cassette deck slides away into the main body to preserve the unit's compact looks.

One further point which could be of interest to schools and colleges is that the whole unit is lockable, making it safe from small children's meddling fingers.

The Micro Tidy costs £59.95 without legs and £79.90 with them. Further details can be obtained from Abacus Marketing Ltd, Abacus House, 60 Barbourne, Worcester, WR1 1JA. Tel: 0905 611161.

Micro-Myte 60

The Micro-Myte is an acoustic modem for use with the Sinclair Spectrum and the ZX81. Unlike other modems which are designed to let the user tie in to databases like Micronet, the Micro-Myte is designed to enable users to transfer data, information and programs between their computers.

When you buy the Micro-Myte you get the modem itself, a connecting cable, a registration card and a cassette containing the software to drive the modem. For the purpose of this review I will describe its action in conjunction with a Spectrum.

To connect the unit up you first take the power lead from the Spectrum's power supply and plug it in to the labelled socket on the front of the Micro-Myte. You then take the lead supplied with the modem and plug one end into the modem and the other into the power socket on the back of the Spectrum. You are now powering both the modem and the Spectrum off the same power supply. You then take the cassette lead from the Spectrum and plug it into either the signal in or signal out socket on the modem. You must only use one of these sockets at any one time, depending on whether you wish to transmit or receive data.

The tape contains a small machine code routine which loads to the top of memory. As it is only 800 bytes long it doesn't eat up to much memory space. The software is called by using RAND USR 64500.

To start using the Micro-Myte you must first have someone else with a modem and a compatible computer at the other end of the telephone line. So, you dial up your friend and make sure he has his system set up and ready to transmit receive.

You then both place your handsets onto the modem and secure them using the velcro strip supplied. Enter RAND USR 64500 and the Spectrum will reply with a prompt line at the bottom of the screen. This will give you the option of transmitting or receiving. If you choose to receive the screen will periodically flash with a black border on a white frame. This tells you that it is waiting for information to be sent.

If you selected transmit you will be prompted with a further question. This gives you the option to transmit either a program, screen contents or data. If you select program the computer will start to transmit the program in memory down the phone line to the receiving computer. At the receive end the computer's border will flash showing it is ready to receive. It will then enter a process which resembles an ordinary tape load. When the computer has finished transmitting you will be able to break out and run the program.

The software will also allow you to transmit a complete screen full of information. This can be anything as the software decodes it in a similar way to a SCREEN$.

The data option will enable you to send a block of data between the two computers.

In practice the system worked very well. There was one slight problem when a program which had been loaded into one computer was run before being transmitted. It happened that this particular program set up its own machine code routine above RAMTOP, wiping out the modem driver routine.

The software is written to take account of bad or old phone equipment and will adjust the signal it produces to give the optimum transmission for any phone line.

If you have a Spectrum or ZX81 and know someone else with one you could have a lot of fun swapping programs or pictures over the phone lines to each other. And if you have not got a Sinclair computer they are hoping to bring out a version for use with the BBC Micro. The Micro Myte 60 costs £48.00 and further details can be obtained from Micro Myte Communications Ltd, Polo House, 27 Princes Street, Bristol. The telephone number is 0272 299373.

Speech synthesiser

Once again we return to the increasingly popular field of speech synthesis. Spirit Instruments from Essex have produced a very compact unit which will work with the Spectrum.

This unit is encased in a heavy duty, black plastic case. Connection to the Spectrum is via an edge connector which protrudes from the front of the casing. Also mounted on the front is a single volume control and an output for connection to an external speaker. The unit is fitted with its own internal speaker which is controlled by the volume control.

The design of the expansion connector worried me slightly. The outside edge of the connector is nearly two centimeters away from the case. The first centimeter of this taken up with bare metal connecting pins which come straight off the PCB. Firstly, any movement of the unit will put a strain on the connecting pins, possibly causing them to break away from the PCB.

Secondly, because these pins are exposed, any metal object which falls down behind the Spectrum will fall onto them. This could cause a short circuit, leading possibly to the demise of the synthesiser, or Spectrum, and probably both. I would have preferred to see the casing extended to cover the connector and provide more support for the unit as a whole.

Criticisms of the hardware aside the synthesiser worked very well. Words are formed by calling allophones from a table in the synthesiser. On the programming side it is simply a question of feeding numbers through the Spectrum's OUT command to the unit.

You are given a table of the basic allophones and their corresponding numbers. Some of them can be doubled to allow strength or emphasis on certain parts of a word. You are also provided with five variable length pauses which can be used within words or as separaters. In the documentation each allophone is accompanied by word which illustrates the sound which it makes. This system put no restriction on the number of words you can produce with this unit, it is just a case of trying different allophone combinations until the word sounds right.

The quality of the speech produced was good for this kind of unit and it improves as you learn to make better use of the allophones.

The Speech Synthesiser costs £39.00 and further details can be obtained from Spirit Instruments, Station Road, Maldon, Essex, CM9 7LQ. Tel: 0621 56969.

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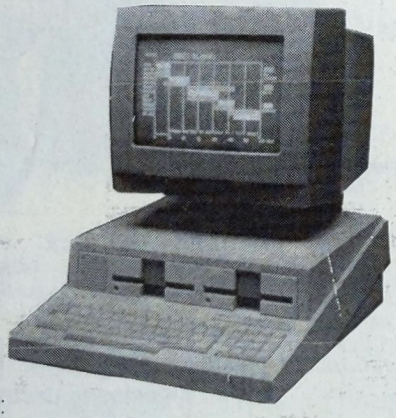

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JUNGLE TROUBLE! (Spectrum 16K/48K)
A highly addictive and very funny pure machine code game set in the depths of the African jungle. Lurking crocodiles, marauding apes, the pit of fire . . . Come back Tarzan . . . All is forgiven!! **£6.95**

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The books assume absolutely no knowledge about computers and the reader is shown even the most fundamental operations such as "switching on" and "loading a program". The books lead the reader through simple programming and then on to graphics, with several programs which show how to achieve pictures and even animation!

The user-friendly approach is consistent throughout the text – not only are program listings clearly shown, but in many cases, a photograph is included to show what the program looks like when actually loaded and run!

All books in the series are £5.95 (incl. postage).

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SOFTWARE

HAUNTED CASTLE

You have been accused of assassinating the much loved king of a remote Pacific island. The only way for you to clear your name is to make a visit to the castle which stands on the far side of the island. Your ZX81 is your guide.

You are supplied with enough food to last you exactly 1000 turns. You can find extra food on the island, but only if you escape from the castle.

Rumour has it that the castle is haunted by several different types of evil spirits and monsters (which I will simply refer to as SPIRITS). They will attack you at the least provocation. In fact, if you merely enter a room occupied by a spirit, you will be forced into a confrontation.

When you meet a spirit, you will be given the opportunity to either fight or run away.

If you decide not to fight you may still be pursued by the spirit and attacked from behind and if this happens you stand no chance whatsoever of survival. On the other hand, if you opt to fight the spirit you will be told the percentage chance of surviving a fight to the death. You will then be given the option of running for your life.

Hidden Spirits

The ZX81 sometimes forgets to inform you of the presence of a spirit when you enter a room. So don't be alarmed if you are asked to fight a spirit of whose presence you weren't aware.

A constant check is kept on the amount of treasure in your possession, the amount of food you have left and the number of moves that have been made.

It is not necessary to construct a chart showing the position of the spirits within the castle because nobody knows exactly how many spirits inhabit the castle.

Two friendly spirits wander aimlessly through the castle. These will 'tag along' with you, helping you to kill certain spirits. The first friendly spirit you meet will help you kill poltergeists and the second helps you to kill any vampires which you might come across.

Haunted Castle occupies just under 11K on the ZX81.

PROGRAM LISTING

```
   1 REM HAUNTED CASTLE - WRITTE
N BY MARTIN BANKS - JUNE 1982
   2 PRINT AT 10,0;"START TAPE T
HEN PRESS ANY KEY"
   3 IF INKEY$="" THEN GOTO 3
   4 SAVE "HAUNTED CASTLE"
   5 LET Z=INT (RND*1000)+10
   6 FAST
   7 GO SUB 8000
  10 LET SPIRITA=0
  11 LET SPIRITB=0
  14 LET FOOD=1000
  15 LET GHOSTS=INT (RND*15)+5
  16 DIM A$(5,11)
  20 LET A$(1)="SPECTRE"
  25 LET A$(2)="POLTERGEIST"
  30 LET A$(3)="VAMPIRE"
  35 LET A$(4)="WEREWOLF"
  40 LET A$(5)="DINOSAUR"
  41 LET TRE=0
  42 LET MOVE=0
  43 PRINT AT 15,0;"YOU HAVE ENT
ERED A ROOM
  44 FOR A=0 TO 150
  45 NEXT A
  48 CLS
  49 LET D=INT (RND*20)
  50 GOSUB 8000
  52 IF D=10 THEN PRINT AT 0,0;"
"
  53 IF D=10 THEN PRINT AT 0,0;"
YOU HAVE FOUND SOME FOOD
  54 IF D=10 THEN LET FOOD=FOOD+
INT (RND*30)+10
  55 CLS
  56 IF D>14 AND SPIRITA<1 THEN
PRINT "YOU HAVE MET A FRIENDLY S
PIRIT "
  57 IF D>14 THEN LET SPIRITA=SP
IRITA+1
  58 IF D=12 AND SPIRITB<1 THEN
PRINT "YOU HAVE MET A FRIENDLY S
PIRIT "
  59 IF D=12 THEN LET SPIRITB=SP
IRITB+1
  60 PRINT AT 3,0;"TREASURE=";TR
E;AT 3,17;"MOVE=";MOVE
  61 LET FOOD=FOOD-1
  67 IF INT (RND*5)>3 THEN PRINT
 "THE ";A$(B);" IS AFTER YOU"
  68 IF SPIRITA>0 AND B=2 THEN P
RINT "THAT FRIENDLY SPIRIT KILLE
D THE ";A$(B)
  69 IF SPIRITA>0 AND B=2 THEN F
OR A=0 TO 150
  70 IF SPIRITA>0 AND B=2 THEN N
EXT A
  72 IF SPIRITA>0 AND B=2 THEN L
ET GHOSTS=GHOSTS-1
  73 IF SPIRITB>0 AND B=3 THEN P
RINT "THAT FRIENDLY SPIRIT KILLE
D THE ";A$(B)
  74 IF SPIRITA>0 AND B=2 OR SPI
RITB>0 AND B=3 THEN GOTO 125
  75 PRINT AT 12,0;"DO YOU WANT
TO:-";AT 14,0;"(A) FIGHT THE ";A
$(B);AT 16,15;"OR";AT 18,0;"(B)
RUN AWAY"
  78 LET X$=INKEY$
  79 IF X$="" THEN GO TO 78
  81 IF SPIRITA>0 AND B=2 OR SPI
RITB>0 AND B=3 THEN GOTO 125
  85 IF X$="B" THEN LET MOVE=MOV
E+4
  86 IF X$="B" THEN CLS
  87 IF X$="B" THEN PRINT AT 15,
0;"YOU ARE RUNNING YOUR HARDEST
"
  88 IF X$="B" THEN FOR A=0 TO 1
00
  89 IF X$="B" THEN NEXT A
  90 IF X$="B" THEN GOTO 46
  92 IF X$="A" THEN LET X=INT (R
ND*100)
  93 IF X$="A" THEN CLS
  94 IF X$="A" THEN PRINT AT 12,
0;"YOUR CHANCES IN A FIGHT ARE "
;X;AT 13,0;"PERCENT"
  95 FOR A=0 TO 100
  96 NEXT A
  97 CLS
  98 IF X$="A" THEN PRINT AT 15,
0;"DO YOU WANT TO TRY YOUR SKILL
?"
  99 LET C$=INKEY$
 100 IF C$="" THEN GOTO 99
 105 IF C$="N" THEN LET MOVE=MOV
E+4
 106 IF C$="N" THEN PRINT AT 15,
0;"YOU ARE RUNNING YOUR HARDEST
"
 108 LET N=INT (RND*80)
 109 IF C$="N" THEN GOTO 7500
 110 LET X=INT (RND*100)
```

DRAGON

HAUNTED CASTLE

```
 111 IF X>N THEN LET GHOSTS=GHOS
TS-1
 112 IF X>N THEN PRINT AT 15,0;"
YOU CAN BREATH EASILY AGAIN,YOU
HAVE KILLED THE  ";A$(B)
 114 FOR A=0 TO 300
 115 NEXT A
 118 CLS
 119 IF X<N THEN GOTO  7500
 120 IF FOOD<=0 THEN PRINT AT 15
,0;"YOU HAVE RUN OUT OF FOOD"
 125 IF FOOD<=0 THEN GOTO  7500
 126 PRINT AT 4,0;"WHICH WAY DO
YOU WANT TO MOVE ?";AT 5,0;"
                            "
 266 PRINT AT 6,0;"(W)=WEST  (E)=
EAST  (N)=NORTH AND  (S)=SOUTH"
 270 LET B$=INKEY$
 271 IF B$="" THEN GO TO 270
 275 CLS
 277 IF MOVE=Z THEN CLS
 278 IF MOVE=Z THEN PRINT AT 15,
0;"YOU HAVE ESCAPED FROM THE";AT
 16,10;"HAUNTED CASTLE";AT 17,0;
"A SHIP IS ON ITS WAY TO PICK";A
T 18,3;"YOU UP"
 279 FOR A=0 TO 200
 280 NEXT A
 285 IF MOVE=Z THEN GOTO  6000
 290 LET K=INT (RND*20)
 300 IF K=14 THEN CLS
 310 IF K=14 THEN PRINT AT 15,0;
"A FRIENDLY OLD MAN HAS GIVEN
 YOU A LARGE PAPER PARCEL
 CONTAINING ENOUGH FOOD TO LAST
 YOU FOR 50 MOVES"
 320 IF K=14 THEN LET FOOD=FOOD+
50
 330 IF K=14 THEN PAUSE 150
 340 IF Z=259 THEN CLS
 345 IF Z=259 THEN PRINT AT 5,0;
"A SMALL DWARF DRESSED IN A
 BRIGHT PINK COAT HAS GIVEN YOU
 A LITTLE BAG WITH YOUR NAME
 WRITTEN ON IT"
 350 LET P=INT (RND*12)
 360 IF Z=259 THEN PRINT "THE BA
G CONTAINS :"
 370 IF Z=259 THEN PRINT
 380 IF Z=259 AND P>=8 THEN PRIN
T "£500,000,000 IN CASH"
 390 IF Z=259 AND P>=3 THEN LET
TRE=TRE+5000000000
 400 IF Z=259 AND P<5 THEN PRINT
 "HALF A BRICK AND A HANDFULL OF
                 COMPOST"
 410 IF Z=259 AND P=6 THEN PRINT
 "A BOMB..THAT DWARF WASNT SO NI
CE                AFTER ALL"
 420 IF Z=259 AND P=6 THEN FOR A
=0 TO 200
 421 IF Z=259 AND P=6 THEN NEXT
A
 425 IF Z=259 AND P=6 THEN GOTO
 7500
 430 IF Z=259 AND P=7 THEN PRINT
 "NOTHING"
 435 IF Z=259 AND P=7 THEN FOR A
=0 TO 150
 436 IF Z=259 AND P=7 THEN NEXT
A
 440 GO TO 46
6000 REM ESCAPE
6010 FOR A=0 TO 63
6020 PLOT A,0
6025 PLOT A,1
6030 PLOT A,2
6035 PLOT A,3
6040 PLOT A,4
6045 PLOT A,5
6050 PLOT A,6
6055 PLOT A,7
6060 PLOT A,8
6065 PLOT A,9
6066 NEXT A
6067 PLOT 17,11
6068 PLOT 16,10
6069 PLOT 29,10
6070 PLOT 30,11
6075 FOR B=12 TO 21
6080 PLOT 16,B
6085 PLOT 31,B
6090 NEXT B
6095 FOR C=22 TO 25
6100 PLOT 18,C
6105 PLOT 29,C
6110 NEXT C
6115 FOR D=16 TO 31
6120 PLOT D,21
6125 NEXT D
6130 FOR E=18 TO 29
6135 PLOT E,26
6140 NEXT E
6145 FOR F=27 TO 30
6150 PLOT 22,F
6155 PLOT 25,F
6160 NEXT F
6165 FOR G=22 TO 25
6170 PLOT G,29
6175 PLOT G,30
6180 NEXT G
6185 PRINT AT 2,5;"YOU ARE SAILI
NG HOME"
6190 PLOT 24,31
6195 PRINT AT 5,13;CHR$ 6;AT 5,1
4;CHR$ 3;AT 4,15;CHR$ 6;CHR$ 134
;CHR$ 3
6200 FOR A=0 TO 200
6205 NEXT A
6210 GO TO 9999
7500 REM ROUTINE TO DIE
7501 PRINT AT 2,5;"YOU HAVE BEEN
 KILLED"
7503 FOR A=26 TO 37
7504 PLOT 28,A
7505 PLOT 27,A
7506 NEXT A
7507 FOR B=23 TO 32
7508 PLOT B,32
7509 PLOT B,33
7510 NEXT B
7511 FOR C=2 TO 21
7512 PLOT 3,C
7513 PLOT 25,C
7514 PLOT 37,C
7515 NEXT C
7516 FOR D=3 TO 12
7517 PLOT D,14
7518 PLOT D,21
7519 NEXT D
7520 PLOT 9,13
7521 PLOT 10,12
7522 PLOT 11,11
7523 FOR E=2 TO 10
7524 PLOT 12,E
7525 NEXT E
7526 FOR F=14 TO 21
7527 PLOT 12,F
7528 PLOT 46,F
7529 NEXT F
7530 FOR G=16 TO 34
7531 PLOT G,2
7532 PLOT G,21
7533 NEXT G
7534 FOR H=37 TO 46
7535 PLOT H,14
7536 PLOT H,21
7537 NEXT H
7538 FOR I=0 TO 23
7539 PLOT 52,I
7540 PLOT 53,I
7541 NEXT I
7542 PLOT 52,2
7543 PLOT 52,3
7544 PLOT 53,2
7545 PLOT 53,3
7550 GOTO  9999
8000 REM SUBROUTINE TO MOVE
8005 LET MOVE=MOVE+1
8010 LET A=INT (RND*3)
8015 IF A>0 THEN PRINT AT 12,5;"
THERE IS A GHOST IN HERE"
8020 LET B=INT (RND*4)+1
8025 IF A>0 THEN PRINT AT 15,0;"
THE GHOST IS A  ";AT 17,5;A$(B)
8030 IF B>=4 THEN PRINT AT 19,0
"THERE IS SOME TREASURE IN HERE.
```

```
"
8034 LET C=INT (RND#3)+1
8036 IF B>=4 AND C=1 THEN PRINT
AT 20,0;"THE TREASURE IS GOLD...
"
8037 IF B>=4 AND C=1 THEN LET TR
E=TRE+10
8038 IF B>4 AND C=2 THEN PRINT A
T 20,0;"THE TREASURE IS SILVER..
."
8039 IF B>=4 AND C=2 THEN LET TR
E=TRE+5
8040 IF B>=4 AND C=3 THEN PRINT
AT 20,0;"THE TREASURE IS COPPER.
.."
8045 IF B>=4 AND C=3 THEN LET TR
E=TRE+2
8050 IF B>=4 AND C=4 THEN PRINT
AT 20,0;"THE TREASURE IS JEWELS.
.."
8055 IF B>=4 AND C=4 THEN LET TR
E=TRE+1
8056 FOR A=0 TO 100
8057 NEXT A
8060 RETURN
9000 REM INTRODUCTION
9001 FOR A=38 TO 41
9002 PLOT 3,A
9003 PLOT 7,A
9004 PLOT 9,A
9005 PLOT 14,A
9006 PLOT 20,A
9007 PLOT 26,A
9008 PLOT 29,A
9009 PLOT 31,A
9010 PLOT 35,A
9011 PLOT 37,A
9012 PLOT 47,A
9014 PLOT 51,A
9015 PLOT 54,A
9016 FOR B=3 TO 6
9017 PLOT B,38
9018 FOR C=9 TO 12
9019 PLOT C,38
9020 PLOT C,40
9021 PLOT C,41
9022 FOR D=15 TO 18
9023 PLOT D,38
9024 FOR E=21 TO 24
9025 PLOT E,38
9026 PLOT E,41
9027 FOR F=27 TO 29
9028 PLOT F,38
9029 PLOT F,41
9030 PLOT 3,39
9031 FOR G=31 TO 34
9032 PLOT G,41
9033 PLOT 33,40
9034 FOR H=37 TO 40
9035 PLOT H,38
9036 PLOT H,40
9037 NEXT B
9038 FOR I=45 TO 49
9039 PLOT I,40
9040 FOR J=51 TO 54
9041 PLOT J,38
9042 PLOT J,41
9043 FOR K=28 TO 31
9044 PLOT 21,K
9045 PLOT 25,K
9046 PLOT 28,K
9047 PLOT 30,K
9048 FOR L=19 TO 23
9049 PLOT L,31
9050 FOR M=25 TO 28
9051 PLOT M,30
9052 FOR N=31 TO 34
9053 PLOT N,28
9054 PLOT N,30
9055 PLOT N,31
9056 NEXT A
9057 NEXT B
9058 NEXT C
9059 NEXT D
9060 NEXT E
9061 NEXT F
9062 NEXT G
9063 NEXT H
9064 NEXT I
9065 NEXT J
9066 NEXT K
9067 NEXT L
9068 NEXT M
9069 NEXT N
9071 PLOT 53,2
9072 PLOT 53,5
9073 PLOT 53,6
9074 PLOT 53,9
9075 PLOT 53,10
9076 PLOT 54,3
9077 PLOT 55,4
9078 PLOT 54,4
9079 PLOT 54,7
9080 PLOT 54,8
9081 PLOT 54,11
9082 PLOT 55,6
9083 PLOT 55,9
9084 PLOT 55,11
9085 PLOT 56,4
9086 PLOT 56,5
9087 PLOT 56,6
9088 PLOT 56,11
9089 PLOT 57,5
9090 PLOT 57,6
9091 PLOT 57,9
9092 PLOT 57,11
9093 PLOT 58,6
9094 PLOT 58,9
9095 PLOT 58,10
9096 PLOT 59,7
9097 PLOT 59,8
9098 FOR A=16 TO 25
9099 PLOT 1,A
9100 PLOT 5,A
9101 PLOT 7,A
9102 PLOT 12,A
9103 PLOT 14,A
9104 PLOT 19,A
9105 PLOT 21,A
9106 PLOT 26,A
9107 PLOT 32,A
9108 PLOT 37,A
9109 PLOT 45,A
9110 NEXT A
9111 FOR B=1 TO 5
9112 PLOT B,20
9113 NEXT B
9114 FOR C=7 TO 12
9115 PLOT C,20
9116 PLOT C,25
9117 NEXT C
9118 UNPLOT 12,25
9119 UNPLOT 7,25
9120 FOR D=15 TO 19
9121 PLOT D,16
9122 NEXT D
9123 FOR E=21 TO 26
9124 PLOT E,25
9125 NEXT E
9126 FOR F=29 TO 35
9127 PLOT F,25
9128 NEXT F
9129 FOR G=37 TO 42
9130 PLOT G,16
9131 PLOT G,21
9132 PLOT G,25
9133 NEXT G
9134 PRINT AT 9,23;CHR$ 3;CHR$ 3
31;AT 10,25;CHR$ 134;AT 11,25;CH
R$ 133;AT 12,25;CHR$ 6;AT 13,23;
CHR$ 131;CHR$ 6
9136 FOR A=2 TO 11
9137 PLOT 1,A
9138 PLOT 8,A
9139 PLOT 13,A
9140 PLOT 27,A
9141 PLOT 33,A
9142 PLOT 41,A
9143 NEXT A
9144 FOR B=1 TO 6
9145 PLOT B,2
9146 PLOT B,11
9147 NEXT B
9148 FOR C=9 TO 12
9149 PLOT C,6
9150 PLOT C,11
9151 NEXT C
```

HAUNTED CASTLE

```
9152 UNPLOT 8,11
9153 UNPLOT 3,11
9154 FOR D=15 TO 20
9155 PLOT D,2
9156 PLOT D,6
9157 PLOT D,11
9158 NEXT D
9159 FOR E=2 TO 5
9160 PLOT 20,E
9161 NEXT E
9162 FOR F=6 TO 11
9163 PLOT 15,F
9164 NEXT F
9165 FOR G=23 TO 31
9166 PLOT G,11
9167 NEXT G
9168 FOR H=33 TO 39
9169 PLOT H,2
9170 NEXT H
9171 FOR I=41 TO 46
9172 PLOT I,2
9173 PLOT I,7
9174 PLOT I,11
9175 NEXT I
9176 SLOW
9177 FOR A=0 TO 500
9178 NEXT A
9181 CLS
9182 GOTO  9500
9184 REM DRAW CASTLE
9185 FOR A=9 TO 62
9186 PLOT A,2
9187 NEXT A
9188 FOR B=2 TO 31
9189 PLOT 9,B
9190 PLOT 63,B
9191 NEXT B
9192 FOR C=14 TO 21
9193 PLOT 19,C
9194 PLOT 52,C
9195 NEXT C
9196 FOR D=28 TO 43
9197 PLOT D,22
9198 NEXT D
9199 FOR E=22 TO 31
9200 PLOT 28,E
9201 PLOT 43,E
9202 NEXT E
9203 FOR F=26 TO 31
9204 PLOT 23,F
9205 PLOT 48,F
9206 PLOT 21,F
9207 PLOT 50,F
9208 PLOT 55,F
9209 PLOT 15,F
9210 PLOT 14,F
9211 PLOT 57,F
9212 PLOT 15,26
9213 PLOT 22,26
9214 PLOT 49,26
9215 PLOT 56,26
9216 NEXT F
9217 FOR G=9 TO 13
9218 PLOT G,31
9219 NEXT G
9220 FOR H=17 TO 20
9221 PLOT H,31
9222 NEXT H
9223 FOR I=23 TO 28
9224 PLOT I,31
9225 NEXT I
9226 FOR J=43 TO 48
9227 PLOT J,31
9228 NEXT J
9229 FOR K=50 TO 55
9230 PLOT K,30
9231 NEXT K
9232 FOR L=57 TO 62
9233 PLOT L,31
9234 NEXT L
9266 FOR M=22 TO 40
9267 PLOT 36,M
9268 NEXT M
9269 PLOT 35,40
9270 PLOT 37,40
9271 FOR N=2 TO 14
9272 PLOT 29,N
9273 PLOT 42,N
9274 NEXT N
9275 PLOT 39,15
9276 PLOT 31,16
9277 PLOT 41,15
9278 PLOT 40,16
9279 FOR O=32 TO 39
9280 PLOT O,17
9281 NEXT O
9282 FOR P=4 TO 15
9283 PLOT 35,P
9284 PLOT 36,P
9285 NEXT P
9286 FOR Q=31 TO 40
9287 PLOT Q,10
9288 PLOT Q,11
9289 NEXT Q
9290 PRINT AT 0,0;"[illegible]
HAUNTED CASTLE...."
9291 FOR A=0 TO 500
9292 NEXT A
9293 RETURN
9500 CLS
9505 PRINT "[illegible]
[illegible]"
9515 PRINT "ON A HILL SOMEWHERE
ON AN ISLANDIN THE PACIFIC OCEAN
 STANDS A"
9520 PRINT "CASTLE, WHICH IS SUP
POSED TO BE HAUNTED BY FIVE KIND
S OF SPIRITSAND MONSTERS,"
9525 PRINT " THIS HAS NOT YET BE
EN PROVEN   BECAUSE ALL THAT HAV
E LEFT THE CASTLE ALIVE (BOTH OF
 THEM)"
9530 PRINT "HAVE BEEN TOO INSANE
 WITH FEAR  TO TELL OF THEIR EXP
ERIENCES"
9535 PRINT "YOUR MAIN AIM IN THE
 GAME IS TOGET OUT THE CASTLE AL
IVE          (THIS IS NOT AS EASY
AS IT        SOUNDS)"
9540 PRINT "TWO FRIENDLY SPIRITS
 WANDER       AROUND, ONE KILLS AN
Y            POLTERGEISTS WHICH Y
OU MEET      WHILE THE OTHER SPIR
IT KILLS ANYVAMPIRES WHICH YOU M
EET"
9545 PRINT "PRESS ANY KEY TO CO
NTINUE"
9555 IF INKEY$="" THEN GOTO 955
5
9556 CLS
9557 PRINT "[illegible]
[illegible]"
9558 PRINT
9560 PRINT "AS YOU WANDER AROUN
D YOU FIND    TREASURES VALUED AS
FOLLOWS:-     GOLD=10 POINTS"
9565 PRINT "SILVER=5 POINTS
            COPPER=2 POINTS
            JEWELS=1 POINT"
9566 PRINT AT 15,10;"GOOD LUCK"
9567 PRINT AT 21,0;"PRESS ANY K
EY TO CONTINUE"
9570 IF INKEY$="" THEN GOTO 957
0
9575 CLS
9580 GOTO 9184
9999 STOP
```

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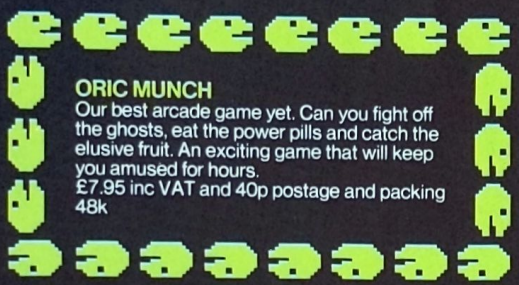

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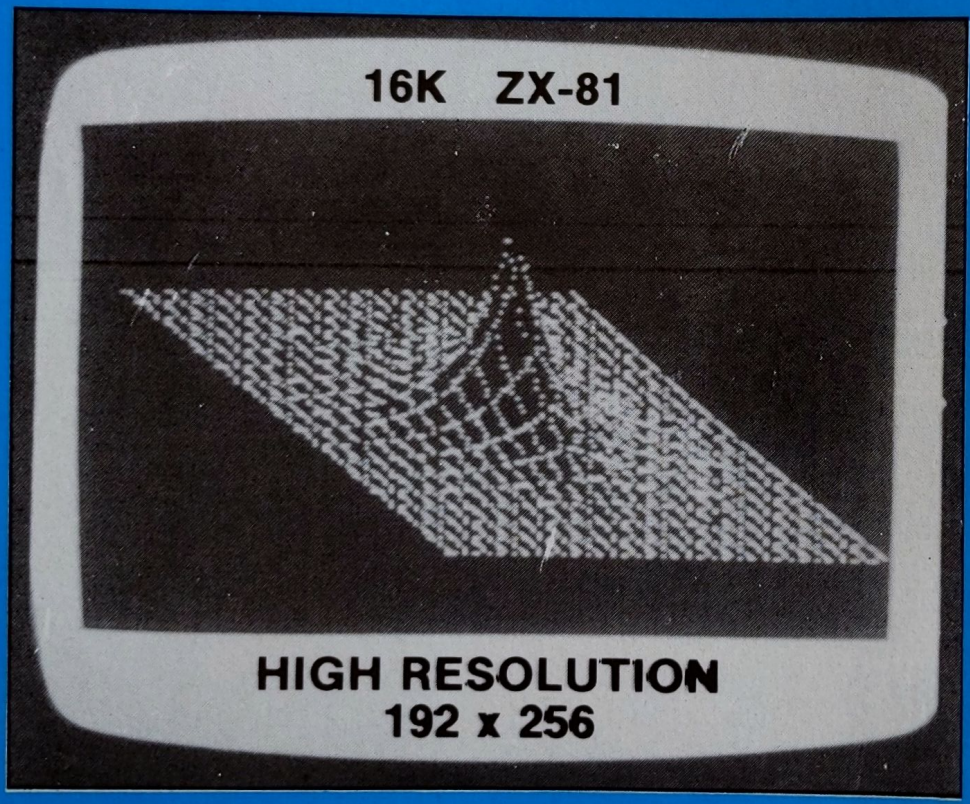

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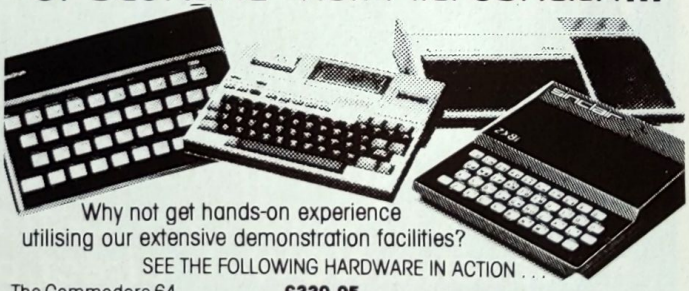

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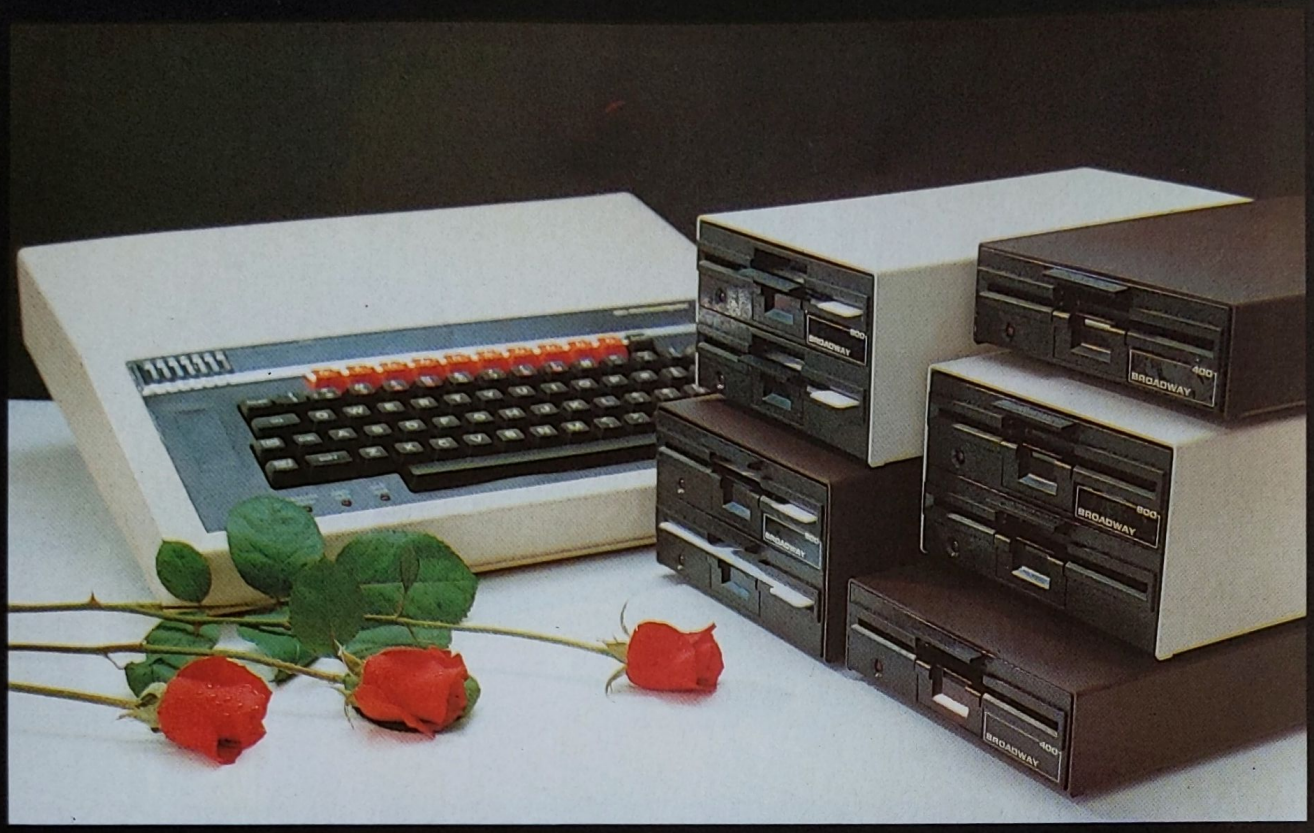

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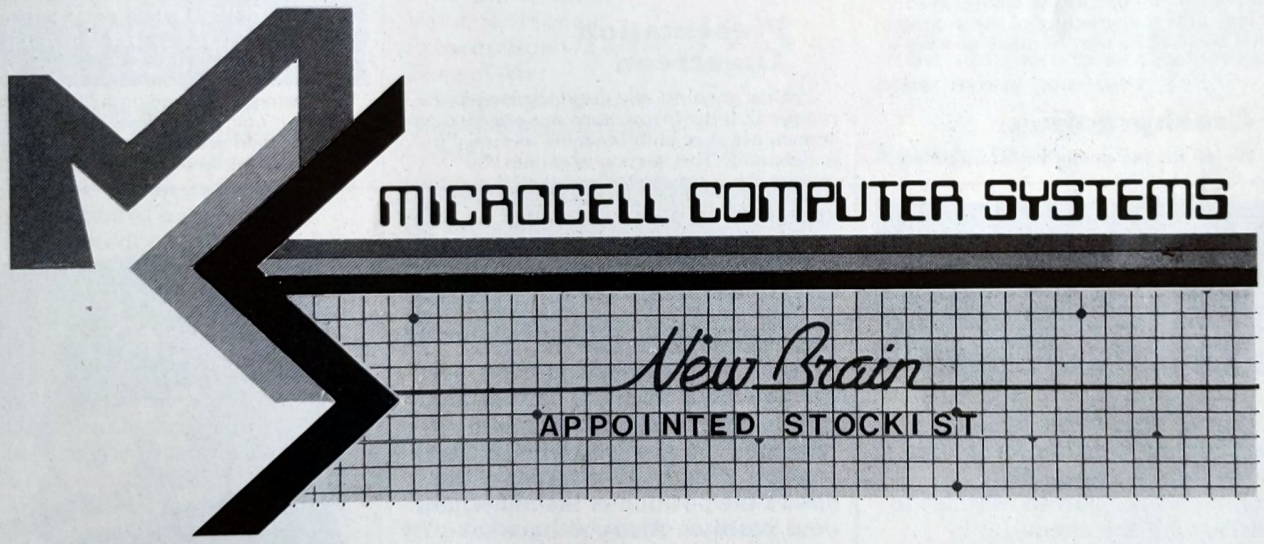

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GAMES

SOFTWARE REVIEWS

Each month PCT will be presenting pages of reviews of the computer programs currently available. We have engaged a team of reviewers, each of whom is a seasoned user of his/her particular machine — and has the crazy streak that means they enjoy playing computer games!

All types of software will, however, be reviewed in these pages; but with around 85% of all home-computer software being of the playful variety, you will be seeing more games than anything else!

Our 'Ratings Table' headings are:

Program Quality

Here we're looking to see how well written the program is, and how well it exploits the computer's capabilities. Also, how logical is the structure of the program? Does it require the user to make guesses to use it?

Crashproofing

We all hit the wrong key sometimes, do we not? Go on, admit it. If the program has been well written, all should not be lost. If, for example, the machine is asking you to enter "Yes" or "No", then any other key except Y or N should illicit no response whatsoever. In other words, how tolerant is the program of us humans?

Value For Money

Quite frankly, some software on sale today is vastly overpriced. With the low cost of cassette tapes, why *should* simple games cost up to £12 per tape? We judge this one on an overall basis — how much work have the suppliers put into the program and is the price reasonable?

Presentation On-screen

How good are the graphics used in the program? If the instructions are provided on screen, are they both readable and easy to understand? This section examines the visual aspects of the package — vital for games!

Ease Of Use

If the program is for, say, an 'action' game, then the author's choice of keys is very important. Try playing "Invaders" with the movement keys reversed, and the "Fire" button right next to 'Reset'! There are many, many ways in which life can be made easy for the program user. We want to see them *all* used!

Supplied Instructions

Regardless of whether the instructions come on sheets of paper, or are presented as text on-screen, they should be as clear and as concise as possible.

Ratings are done on a "Five stars is excellent, one is hopeless" basis, with the reviewer then scoring the supplied package as a whole on a percentage scale.

Title:	**Yomp**
Type:	**Tape**
Supplier:	**Virgin Games**
Machine:	**Spectrum 16/48K**
Price:	**£7.95**

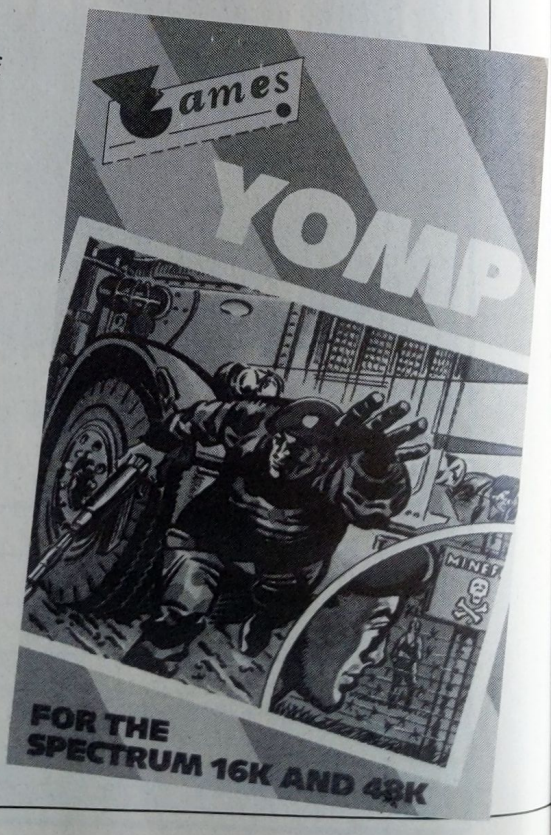
Yomp. That name conjures up visions of hundreds of rain-soaked and mud-splattered soldiers marching across barren hillsides to a destiny with the enemy. Unfortunately all this game offers is a chance to cross a busy main road à la 'Frogger' and navigate your way through a minefield by using radar!!! Definitely one step removed from reality this one.

The purpose of Yomp is to guide soldiers across four lanes of traffic, two moving to the right and two moving to the left. The program uses the '1' and '2' keys to move you left and right. The 'O' key moves you up. It was more than a bit annoying not having a key to move you down. Especially since the movement keys had a nasty habit of repeating too much, often thrusting your head under the wheels of an oncoming truck without giving you the chance to back off and try again.

So much for the Frogger part of the game. If you manage to guide three of your troops across you progress to the minefield. Here you have to move from the bottom to the top of the screen through a minefield. To help you with this task you are given a radar screen which shows the position of the mines and your position. Also you have to avoid an armed guard which patrols across the field at various levels.

If you manage to get the men across the minefield without them treading on a mine or bumping into too many things (as this could set off a mine as well) then you are sent back to the road in order to get three more men across. And so it continues alternating between these two scenarios.

The graphics and colours used in the game did not help the clumsy feel which the game left me with. Movement was very jerky and the character positioning imprecise. For instance, when trying to enter the gate leading to the minefield



your man appears either slightly to the left or slightly to the right of the opening, making it difficult to judge which position was correct.

Overall I was disappointed with YOMP. There is a pattern to the road sequence which, when learnt, makes the road easy to cross. Crossing the minefield is a test of common sense as opposed to skill. After a few tries I became bored and disinclined to try it on a higher level. In conclusion I think there are a lot better games of this nature available for the Spectrum which offer better graphics and deeper game strategy.

C.P.

Ratings Table

Program Quality:	* *
Value for Money:	* *
Presentation On-screen:	* *
Ease of use:	* * *
Crashproofing:	* * * *
Supplied instructions:	* * * *
Overall:	40%

Title:	**Space Adventure**
Type:	**Tape**
Supplier:	**Virgin Games**
Machine:	**BBC Model B**
Price:	**£7.95**

This game is a brilliant combination of both traditional adventure and fast arcade-style action. All the action in the game takes place aboard a spaceship which is deserted, apart from some pretty mean androids. You take the part of an adventurer who sets off around the craft in search of four valuable crystals.

To reach these crystals you must first find four keys, which will enable you to unlock the doors which lead to the crystal rooms. You will also find power packs which are essential for recharging your life support system and your weapons.

The screen display consists of a real-time display of the room you are in, an overall plan of the space ship level you are on and meters showing the state of your weaponry and life support.

The graphics contained within the program are excellent. Good use has been made of colour, high-resolution and animation techniques. Control can be achieved either from the keyboard or from a joystick. You can move your man in eight directions and use of the fire control shoots in the direction you are moving. You are given two weapons, a phaser and a blaster. The first consumes less energy but the second carries more killing power.

The ship contains three levels and on each you will find two transporter rooms. These can be used for either moving between levels or moving to the other end of ship on the same level.

If you enter a room containing an android (or two) you must destroy it before being allowed to leave the room. This can be quite difficult as the robots are uncannily accurate in their fire. The best way to destroy them is to get up close and pump as many shots as possible into them.

The game ends when you have secured all four crystals and have returned to your waiting ship. Even on the lowest level this is a hard task.

Overall, Space Adventure is a thoroughly enjoyable game and I would strongly recommend it to anyone with a Model B.

C.P.

Ratings Table

Program Quality:	* * * * *
Value for Money:	* * * *
Presentation On-screen:	* * * * *
Ease of use:	* * * *
Crashproofing:	* * * *
Supplied instructions:	* * * *
Overall:	90%

Title:	**Sheepwalk**
Type:	**Tape**
Supplier:	**Virgin Games**
Machine:	**Spectrum 48K**
Price:	**£7.95**

Getting a bit tired of travelling to new, exotic galaxies, meeting numerous aliens and killing them? If so then Sheepwalk might come as a pleasant relief. Simply, the idea in Sheepwalk is to round up a flock of errant sheep and guide them back into their pen. To do this you have command of trusty Rex, your sheepdog.

On running the game you are presented with a plan view of the field. On this is displayed the sheep pen, a river with two bridges, haystacks and crops. The game starts with the sheep scattered around the screen. Using four keys to give you left, right, up and down you must move Rex around the field and position him so as to move the sheep back towards their pen.

The algorithm which controls the sheep movements is very good, making this part of the game very realistic. One small criticism, why the control keys had to be placed straight along the bottom row is beyond me. Surely it would have been better to have them arranged in the directions which they represent.

Whilst the task of rounding up the sheep is enough in itself you are faced with other hazards to overcome. You have to keep an eye open for over-zealous sheep who decide to take a quick dip in the river. If they fall in and you don't reach them in time and rescue them you will end up with one very dead sheep which will adversely affect your rating at the end.

The sheep might also stray into the crops planted around the screen. You must drive them out before they do too much damage. You must also be careful when doing this because if you charge in you are likely to end up damaging some yourself.

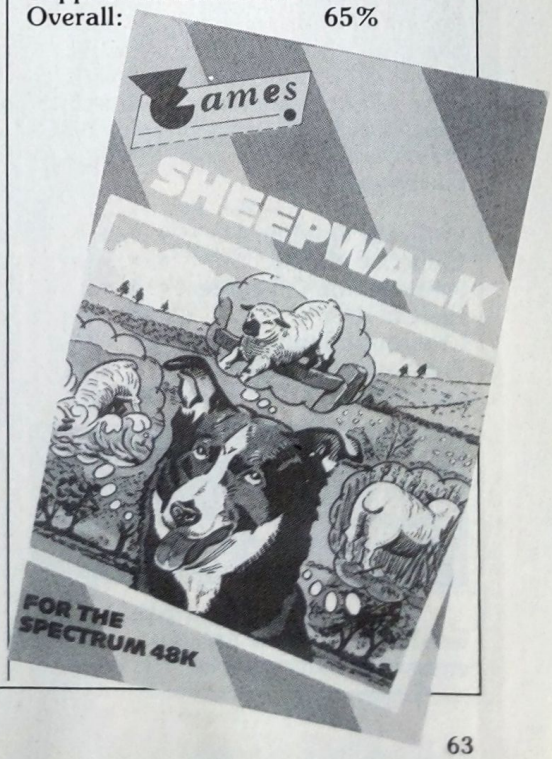
The game ends when all the sheep have been rounded up into the pen. When this is completed, the computer will make an assessment of your performance and award you points.

In all Sheepwalk is a pleasant game, it does not stir the adrenalin to the same extent as some but is nevertheless good fun.

C.P.

Ratings Table

Program Quality:	* * * *
Value for Money:	* * *
Presentation On-screen:	* * * *
Ease of use:	* * *
Crashproofing:	* * *
Supplied instructions:	* * * *
Overall:	65%



Title:	**Vu-Calc**
Type:	**Tape**
Supplier:	**Psion**
Machine:	**BBC Models A & B**
Price:	**£14.95**

This is the sister program to Psion's Vu-File and attains the same high standards of documentation and user friendliness. The program starts with an empty table or grid composed of cells and arranged in rows and columns. Each box or cell is uniquely identified by the row letter followed by the column number. The cursor moves freely about the grid and directs the user's attention at a single cell.

The main command panel allows you to enter text, data and formulae. The result of any formula is printed in the cursor and the formula added to a formula list. As is normal with such programs other cells and their contents can be included in formulae. The command Calculate scans through the whole grid from top to bottom and evaluates the result. Edit commands are available to amend the work sheet and there are the usual saving and printing facilities.

Transfer allows columns and rows to be transposed around the grid and Replicate causes the contents of a specific cell to be reproduced across a specified range.

Psion sensibly warn the purchaser of their Vu-Calc that it will take some time to fully and effectively master the powerful facilities which this program offers. The examples included in the documentation make things fairly clear and the rest will come with practise. If you need to work with figures in this manner then Vu-Calc could be the program for your BBC.

M.W.

Ratings Table

Program Quality:	* * * *
Value for Money:	* * * *
Presentation On-screen:	* * *
Ease of use:	* *
Crashproofing:	* * * *
Supplied instructions:	* * * *
Overall:	75%

Title:	**Vu-File**
Type:	**Tape**
Supplier:	**Psion**
Machine:	**BBC Models A & B**
Price:	**£14.95**

This is an excellent BBC version of the ever present computer filing system. The file structure is standard and very easy to master. It consists of a collection of records, which in turn contain a number of data fields. These fields cannot be longer than one line in Vu-File but this is not a drawback since there is complete flexibility in how the record is split into fields and on screen presentation will probably be the deciding factor. All is carefully explained in the exellent documentation supplied with the program.

When you first enter Vu-File you select the option to format the record layout. Future use will involve loading an existing file from tape or disc for further processing. At this stage you have complete freedom to move the cursor around the blank screen placing the fixed titles of your choice at any location, using a combination of characters, rulings and boxes to partition the screen and exphasise certain data fields. This is where a little thought has to be applied to the sort of layout required, although the editing facilities allows for a change of mind. Data entry is just as easy using the cursor keys and RETURN which moves you on to the next field.

When the relatively hard work of entering information has been completed, it only remains to master the command table which appears at the top of the screen. The commands allow you to scan through the records forwards and backwards. The List command allows a leisurely flip through and Reset takes you back to the first record.

The more complex sorting facilities accessed by Order and Append are explained on the screen and they perform the reordering and addition of further records. The selection of particular records is a formality. Vu-File allows you to search for a match with any string of characters at any position of a string.

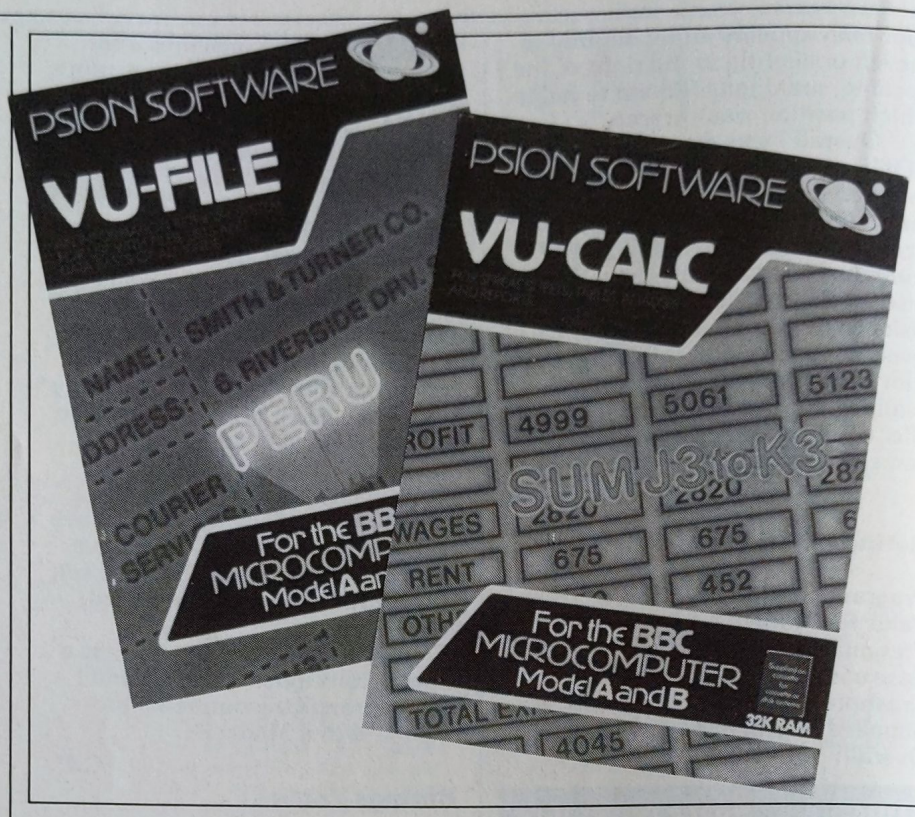
The Print command allows you to set up a print layout and then to print the file. Saving your precious records is made easy and all you have to supply is the file name of your choice. Finally, a very useful feature of Vu-File is the ability to check up on how much memory (expressed as a percentage) your file has taken up.

If the management of data files is one of the reasons you bought your BBC then this Psion package has to be a serious contender for your library of software.

M.W.

Ratings Table

Program Quality:	* * * *
Value for Money:	* * * *
Presentation On-screen:	* * *
Ease of use:	* * * *
Crashproofing:	* * * *
Supplied instructions:	* * * *
Overall:	85%



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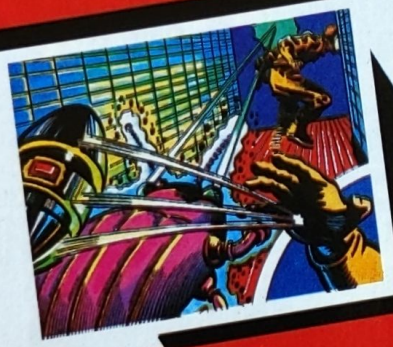

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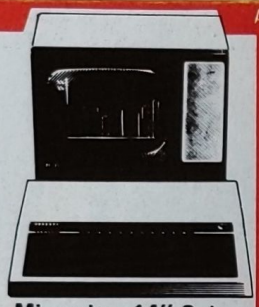

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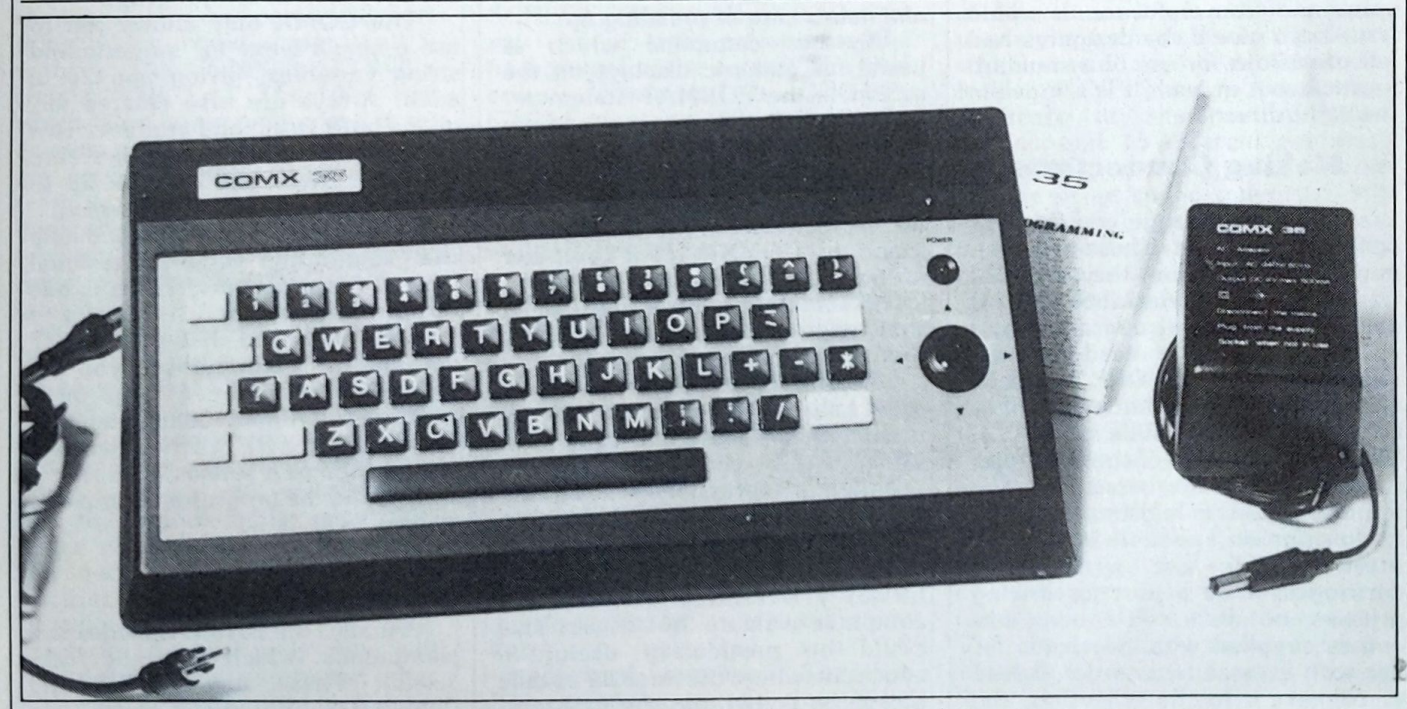
HARDWARE

THE COMX IS COMING

Chris Palmer takes the lid off one of the newest home computers on the market and finds just how the Comx 35 stands up.



Now that new computers are hitting the market with ever increasing frequency a new machine has to have something special to stop it slipping into the "also rans" category. It is difficult to assess the new COMX 35. Certainly it has some very attractive features, but it also has some darker secrets which I feel might narrow the market to which it will appeal.

The COMX contains 32K of usable RAM and is based around the 1802 processor. This is slightly strange in itself. The major percentage of machines on the market are based around either the Z80 or the 6502 processor chips. This will mean that all the budding machine code programmers will have to learn another set of assembly language commands and routines before they can start to write the impressive programs which we take for granted on other machines. This is quite important as you will find out later.

From looking at the computer there is no mistaking its Hong Kong heritage. We actually saw two models, one of which had a black case, gold front and bright orange keys!! The other had a cream coloured case, gold front and black keys. Which of these is going to be the final product is as yet unknown.

Thankfully the designers of the COMX have decided to put a proper moving-keyboard on the computer as opposed to following the current trend towards membrane and rubber keyboards. All the keys have a positive feel to them and respond with a click when pressed.

Keyed UP

The keyboard layout is standard QWERTY. Down the left hand side you have keys for reset, escape, control and delete. Using the reset key in conjunction with the space bar causes the machine to go through a complete cold start.

THE COMX IS COMING

Perhaps the most interesting thing about the layout of the COMX is the joystick they have included. It is recessed into the right hand side of the computer. About half an inch of the shaft pokes up above the surround, so it is definitely only intended for light, finger-tip control. It moves up/down and left/right and can be read by using the KEY command from software. It would have been nice if the designers had left provisions for use of a standard joystick, but at least it is a move in the right direction.

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Making Connections

On the back edge you find the connecting sockets. These include a power input from the external transformer, sockets labelled EAR and MIC for cassette operations and a socket for the lead to the television. The ON/OFF switch is also situated on the back and takes the form of a small slide switch. On the right-hand side of the computer is a recessed edge connector. The manual gives no information as to its function so I assume it must be intended for use with ROM cartridges or as a port for driving printers or discs. The computer comes supplied with two leads for use with a cassette recorder, a lead to connect it to the television, the manual and the power supply.

On powering up the COMX you are faced with a black screen with the COMX logo printed across it in multi-colour. The machine will then beep a few times and change the screen display during the next few seconds. This is just the COMX going through its power-up diagnostic routines. On pressing the RETURN key you then enter COMX BASIC.

Down to Basics

The BASIC resident in the COMX is fairly standard, but it does contain a few extra commands which set it above the sort you would expect on a machine of this price. For instance there is a command called FIXED. This enables you to fix the number of decimal places of accuracy to which numbers will be displayed on the screen. So if you set two places of accuracy and print 12.346, the computer will display on screen 12.35, showing that the command also takes care of rounding up.

Another command which is useful for numeric displays on the screen is the FORMAT statement. This allows you to set up a numeric display field. Once this command is used, all numbers displayed on the screen will be right-aligned within the field. These two commands make the COMX a great computer for people who want to work with a lot of tabulated figures as you can let the computer take care of lining up the figures on the screen.

The FVAL expression will be a great help to people who want to use a computer to crunch equations. Using FVAL you can input an equation or expression in the form of a string and have it evaluated to give a numeric answer. For instance you could input, from the keyboard, SIN(3) + COS(2)/4 and make the computer evaluate the answer. This could be particulary useful in education where the formula usually has to be coded into the program. With the COMX it can be typed in with the program running.

The COMX will let you specify the numbers you use in many ways. They can be integer, floating point, binary, 8 bit hexadecimal and 16bit hexadecimal. All these are available in direct mode as well as in programs, so if you want to find out the decimal equivalent of 03FB all you have to do is to print it on the screen and the answer will be given in decimal.

Handling Variables

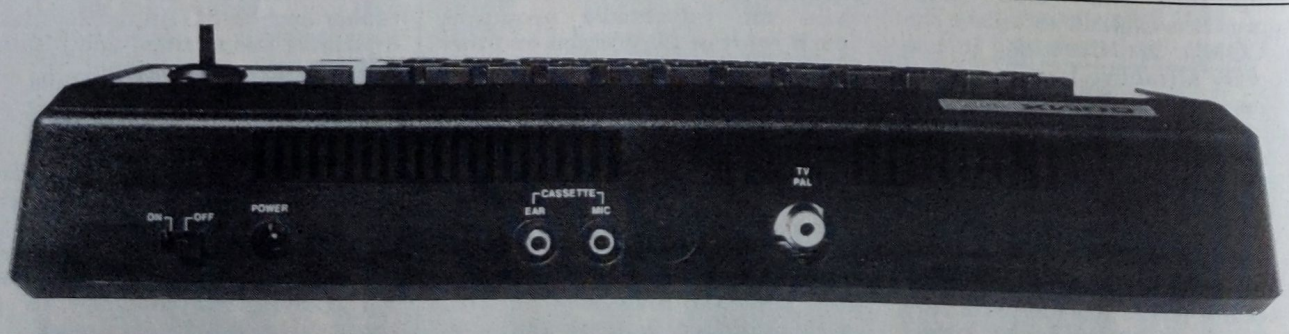
You are allowed to use variables in GOTO and GOSUB statements. For instance if you set variable A to a value of 100 you can then say GOTO A and the program will jump to line 100. To complement this you are given a RUN + command as well as a normal RUN. RUN + causes the computer to search through the program and replace all interpretive branches with their absolute addresses. This speeds up the operation of the program.

The COMX only allows you to use a single letter for numeric and string variables, giving you 26 of each. Arrays are also catered for, giving both string and numeric. Two dimensional numeric arrays are allowed. These can only be up to 255 positions in either dimension.

All the extra commands will help the programmer get a professional look to his programs. There is one command whose inclusion I disagree with and that is the EXIT command. This allows you to escape from either a loop or a subroutine without completing the loop or using a RETURN statement. Useful though it sounds I feel that it would lead the programmer into bad habits.

Time please

Finally, the BASIC includes two commands which can be very useful. These are TIME() and TIMOUT(). By using these two commands it is possible to transfer the operation of the program from one part to another at a specified time. The number placed in the



brackets in the TIME statement becomes operational. It works out that roughly 50 units are equivalent to one second. When the time specified in the TIME statement is reached the computer jumps to the line number specified in the TIMOUT statement.

Slow Coach

So those are the good points if the BASIC, we now come to the one thing which could bring it all to nothing. The COMX is SLOW!! A simple FOR I=1 TO 1000 loop which takes about one second to run on most micros takes 4-5 seconds to run on the COMX. This may not seem too bad but when you start to think about this in terms of a whole program running at this speed you begin to realise that this is a major drawback.

Can you imagine what it would be like to have a games program where your spaceship took ten or fifteen seconds to fly across the screen, and that is without anything else going on. Start to put other ships, laser fire and explosions on and the whole thing gets silly. Hence my comment earlier about how necessary it will be for the machine code geniuses of this world to get to grips with the 1802 processor, becasue only then will you be able to play games and other programs at anything approaching a reasonable speed.

Colour

The COMX implements a good system for making computer interactions a lot easier to understand. When you type something into the computer it appears in one colour and when the computer prints something it appears in another.

While on the subject of colour, the COMX provides three commands to control the colour output. The first of these is COLOR. This controls the colour of all the printing on the screen. It gives you access to 12 colours which have preset luminances. This gives you access to 12 colours which have preset luminances. This command wil change both the colour used for the computer messages and your inputs.

The second command is SCREEN. This enables you to select any one of eight colours for the background of the screen. The final colour command is CTONE. CTONE does not affect the background colour but sets the output colour to a slightly lighter shade of the background colour.

Shaping Up

On the graphics side the COMX is slightly lacking. The computer has some predefined characters and the ability to redefine the character set. However the COMX does not offer any form of high resolution. the nearest it gets to it is the CPOS command which allows you to position the print cursor using X and Y screen coordinates.

The SHAPE command is used for redefining the characters. In it you place the character number you want to redefine and 18 hexadecimal numbers. Together these numbers specify the shape and colour of the new object. This system is not quite as straight forward as others but it works and it does give you more control over the colour of the shape than other computers do.

In the predefined character set you have a space invader, a rocket, a musical note and three characters which fit together to make an airliner. The others are made up of various line shapes and arrows.

Sound

Sound fairs better on the COMX. You have four commands with which to make all the noise you want. These are: MUSIC, NOISE, TONE and VOLUME. MUSIC gives you seven frequencies which can be played over eight octaves at any one of 16 volume levels. NOISE gives you eight frequencies of Gaussian white noise at any one of 15 volume levels. TONE plays a continuous frequency at any one of eight octaves and 15 different volumes. VOLUME governs the overall volume of all sound outputted. All the sound is outputted through an internal speaker which believe me is quite adequate for the task.

Program storage is achieved using an ordinary cassette recorder. You can either save or load programs using the PSAVE/PLOAD commands or data using the DSAVE/DLOAD commands.

The manual which is supplied with the computer is quite good. It runs through the commands giving examples of their use and contains appendices giving error codes, character codes and a quick reference table of the commands. The manual also includes some example programs. I wouldn't say that the topics of these programs are particularly relevant (for instance there is a program which shows you how to calculate the carbon dated age of an object) but they demonstrate well enough how the computer works.

In conclusion, I think the COMX 35 would be a good machine if it weren't for the lack of high resolution and the appalling problems with its slowness. Still it is a flexible computer and the £120 price tag should appeal to potential buyers. It is too early to comment on the availability of software and I feel this could be the deciding factor in whether or not reaches a high level of popularity. ■

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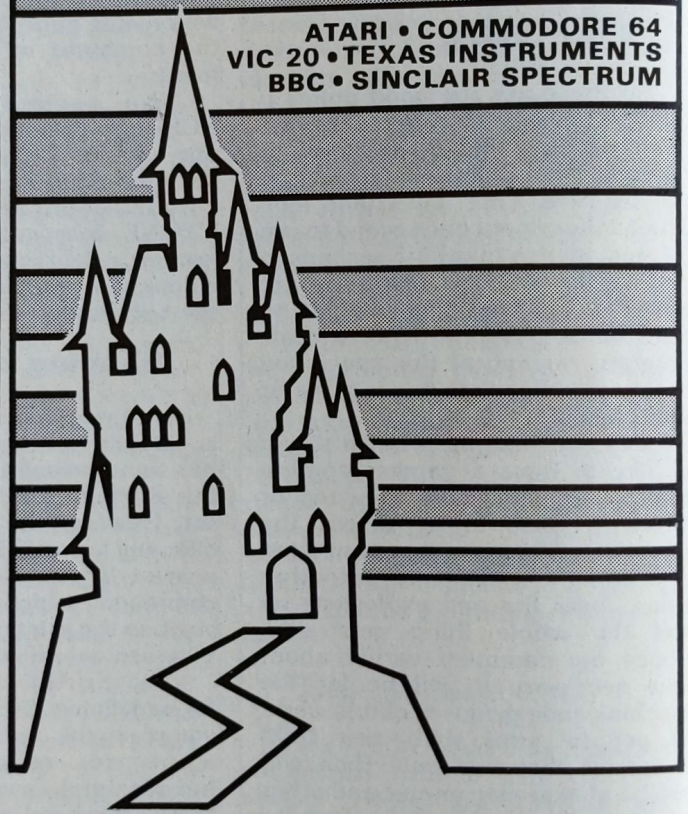

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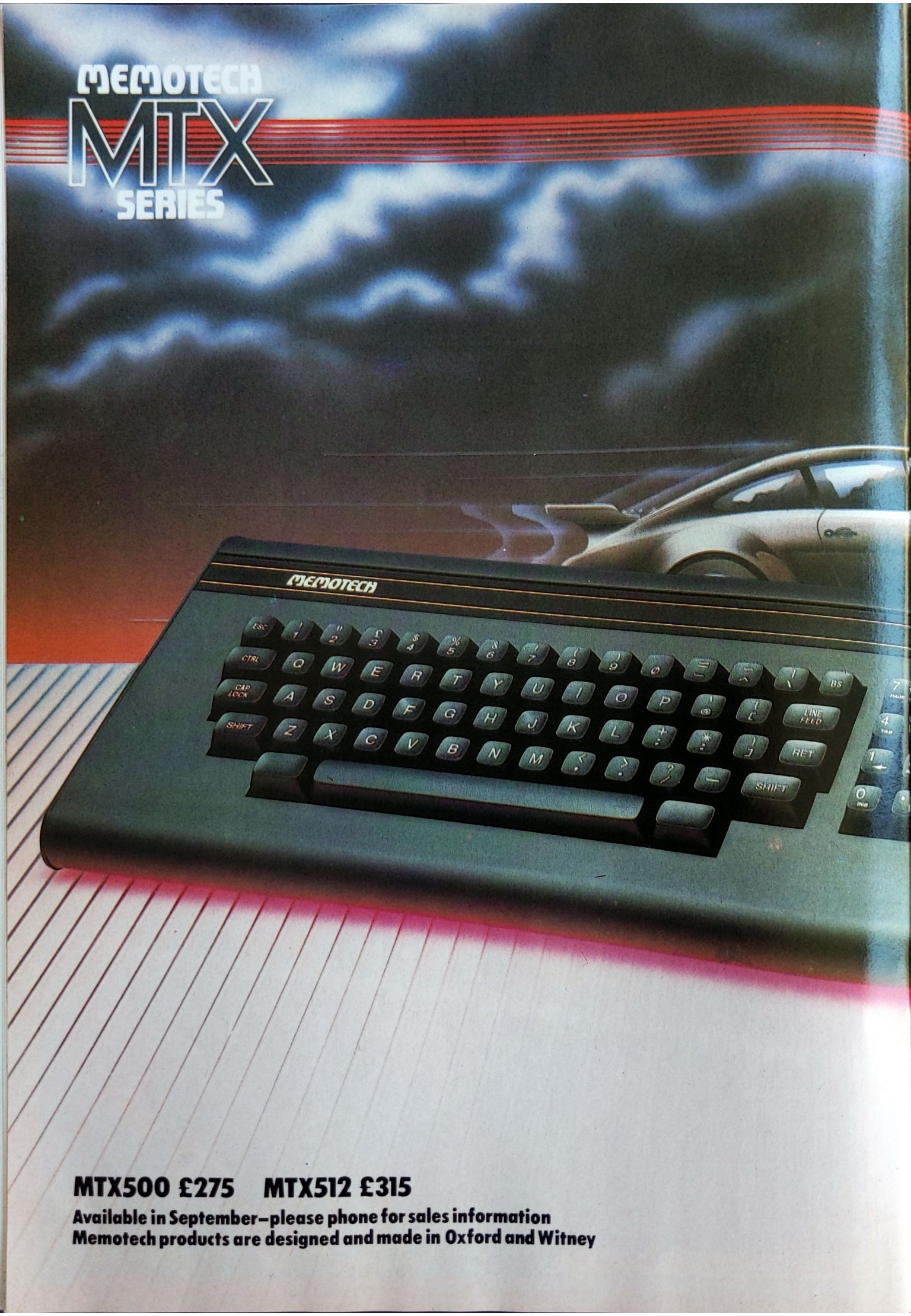
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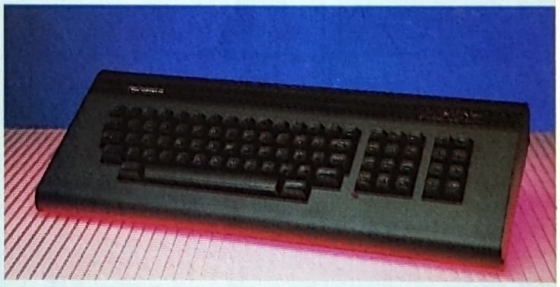

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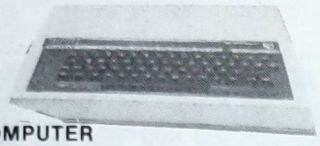

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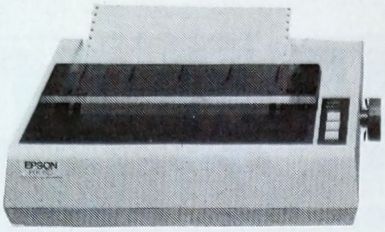

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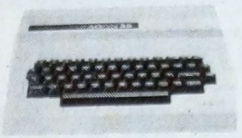

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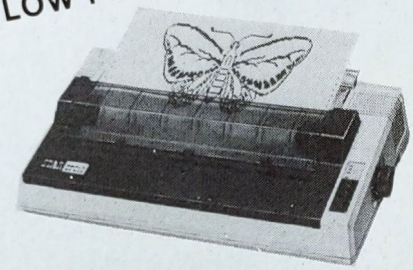

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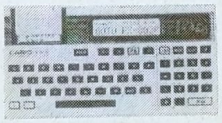

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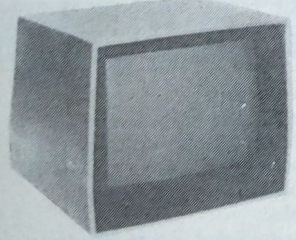

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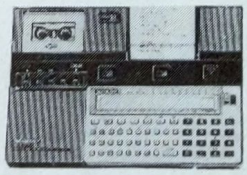

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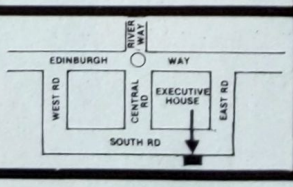


ATOM SOFTWARE

MONSTER COMBAT

Delving deeply into the depths of a make-believe forest A J Presvail has dug up some dangerous creatures. Can you beat them all and so save your skins?

Monster Combat is an action adventure game. In it you have to move around a forest and gather treasures which are hidden there. During your quest you will encounter a selection of evil monsters who will try their best to make sure you do not leave the forest alive.

If you meet a monster you have the option of fighting it, running away or bribing it with some of your treasure. If you manage to slay the monster you will be able to take its treasure.

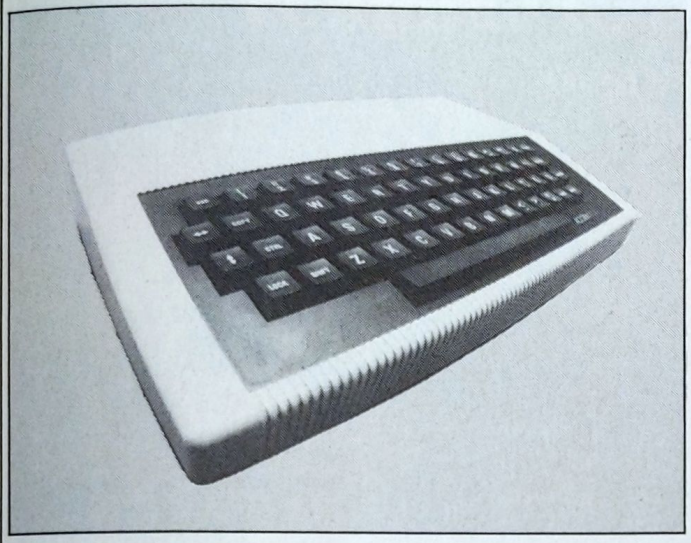
Other creatures you might encounter are giant bats and a giant eagle. If the bats capture you, you will be transported to a new location in the forest. The giant eagle will transport you out of the forest and to safety. You might also find a magic sword which will double your combat strength.

You move about the forest by inputting a compass direction: N = North, S = South, E = East, W = West, NE = North-East, NW = North-West, SE = South-East, SW = South-West.

Monster Combat will run in an Acorn Atom with 5K text space and 1K graphics space.

HOW IT RUNS

1	Dimensions the arrays.
3	Sets up machine code routine.
15-42	Set up more arrays and variables.
45	GOSUBS to display routine and GOSUBS to strength display.
50	GOSUB links.
65-90	Monster encountered — get decision.
100-400	Monster combat.
405-465	Monster selection.
470-473	Pit routine.
475-480	Bat routine.
481-488	Eagle routine.
489-532	Treasure selection and capture routine.
533-560	Movement and direction routine.
635-685	Bribe a monster.
800-852	Mirror and chest routine.
100-1030	You have escaped the forest.
2000-2090	Subroutine a.
2100	Subroutine z.
2200-2201	Subroutine x.
2400	Combat and strength display.
2500-2700	Subroutine i.
3000-3130	Wait and display routine.
5000-5200	Opening screen and title.



HINTS ON CONVERSION

The major problem with converting this program will be understanding the short hand form used for some of the commands. Here are the most common shortened forms:

G. = GOTO
F. = FOR
N. = NEXT
A. = ABS or AND
R. = RND or RETURN
GOS. = GOSUB
P. = PRINT

The Atom also allows GOSUB and GOTO a label. The subroutines are labelled using a lower-case letter. The GOTO and GOSUB statements use this letter to call the routine. This can easily be replaced by a normal GOTO/GOSUB or a procedure.

The program also uses a small machine code routine to simulate the action of a GET statement. This can be replaced where found by a GET or INKEY statement.

PROGRAM LISTING

```
  1DIMAA200,KK2,Z2,XX12,P=#8200
  3(,KK0;JSR#FFE3,STA#80,RTS,),G o
 15N=0,Q=0,P $30,F=0,F A=0TO200,AA(A)=0,N
 40F I=1TO10,F J=1TO15,AA(16*I+J)=1,IFA R %10)6 AA(16*I+J)=2
 41N ,N ,C=A R %1500+500
 42X=1+A R %9,Y=1+A R %15,AA(16*X+Y)=5,F H=0TO2,GOS h,N
 45CLEAR0,GOS a,?#E1=0,GOS 1
 50rGOS b,GOS x
 65IFM=0P "YOU GET THE TREASURE FREE",GOS h,GOS c
 70IFM=100 AND N=1 G d
 75GOS x,P "DO YOU 1 FIGHT 2 RUN 3 BRIBE"'
 80LINK KK0,K=?#80-48,IFK)3G 80
 90GOS x,G (50+K*50)
100IN "HOW MANY COMBAT POINTS" K,GOS x
110IFK)C P "YOU ONLY HAVE "C" POINTS"',G 100
120I=A R %1000,L=20,C=C-K,K=K-(Q/100),A=0
125F H=1000TO0 S.-50,IF(L*(M/10))(K AND H)I,A=1
130L=L-1,N ,GOS x,IFA=1G 510
135P "THE MONSTER KILLED YOU"
137P '"YOU LOSE EVERYTHING."
140P "DO YOU WISH TO TRY AGAIN Y OR N ?"
141LINK KK0,IF?#80=89,G o
142IF?#80=78 P "BETTER LUCK NEXT TIME ",E
143G 141
150I=A R %12,A=0,IF I=11 G 135
155F H=0TO10,IFH*10)M AND H(I ,A=1
160N ,IF A=1 G 170
165G 685
170A=X,B=Y
172X=A R %3-1+A,Y=A R %3-1+B,IF AA(16*X+Y))1 G 172
180IF AA(16*X+Y))0 G p
185AA(16*A+B)=1,AA(16*X+Y)=5,G 43
200G 635
399bP $30''''''''',?#E0=16
400I=A R %13+1,M=I*10,IFI(11 P "A "
405G (410+I*5)
415P "MINOTAUR",G g
420P "CYCLOPS ",G g
425P "ZOMBIE  ",G g
430P "GAINT   ",G g
435P "HARPY   ",G g
440P "GRIFFIN ",G g
445P "CHIMERA ",G g
450P "DRAGON  ",G g
455P "WYVERN  ",G g
460P "WIRWOLF ",G g
465P "NOTHING   ",M=0,G g
470J=A R %20+1,C=C-J,GOS x,P "YOU FELL INTO A PIT AND USED"'
471P J" COMBAT POINTS TO CLIMB OUT.",GOS h
472IFC(100,P " AND DIED WHILE CLIMING OUT !!!!",G 137
473G b
475GOS x,P "A GIANT BAT CARRIED YOU TO A NEWSPOT ",A=X,B=Y
476X=A R %8+2,Y=A R %13+2,IF AA(16*X+Y)=1 G 476
477IF AA(16*X+Y)=4 G 476
479AA(16*A+B)=1,AA(16*X+Y)=5,GOS 1,GOS h,G b
480IFQ(100,G b
481GOS x,P "A GIANT EAGLE CARRIED YOU TO"'"SAFETY ",G 1000
488gP ',?#E0=16
489P "IS GUARDING"',?#E0=16,I=A R %7+1,G (488+I*2)
490P "10 SILVER SPOONS",P=10,R
492P "A JEWELLED SWORD",P=30,R
494P "A JAR OF RUBIES ",P=50,R
496P "A TREASURE CHEST",P=200,R
498P "50 SILVER COINS ",P=50,R
500P "100 GOLD PIECES ",P=100,R
502P "A BOX OF JEWELS ",P=75,R
510P "YOU BEAT THE MONSTER  "
512GOS h
515S=S+1
520cQ=Q+P;IFP=30 GOS e
521IFP=200 G f
530GOS 1,P ';?#E0=16;P "YOU HAVE "Q" "';?#E0=16;P "TREASURE "
531P "POINTS";GOS x
532GOS x
533A=X,B=Y,IN "WHAT DIRECTION" $Z;D=0
534GOS x
535IFZ?0=78 X=X-1
536IFZ?1=87 OR Z?0=87 Y=Y-1
537IFZ?0=83 X=X+1
538IFZ?1=69 OR Z?0=69 Y=Y+1
539IFAA(16*X+Y)=0 G p
540IFAA(16*X+Y)=2 P "RAN INTO A TREE ",X=A,Y=B;G 533
541IFAA(16*X+Y)=4 D=10
545IFF=1;AA(16*A+B)=1;G 560
550AA(16*A+B)=4
560AA(16*X+Y)=5,GOS 1;F=0;G r
635IN "HOW MUCH DO YOU WISH TO PAY? "K;D=0
640IFK)Q GOS x;P "YOU ONLY HAVE "Q" TREASURE POINTS ";G 635
645I=A R %22;L=0,IFI=21 ORK(1 G 135
650F H=0TO20;IFK(=(L*P)/10 AND I)=H D=1
660L=L+1;N ;IFD=1 GOS x;G 680
670P "YOUR BRIBE ACCEPTED ",Q=Q-K;F=1;G 530
680P "YOUR BRIDE WAS NOT ACCEPTED"
685P " YOU MUST FIGHT"';G 100
800eIFA R %10(5 ORC)3000 R
801P '"SWORD ENCHANTED DOUBLES YOUR"'"STRENGTH"
802C=C*2;GOS h;R
850fI=A R %10;IF I=7G 855
851IFI=3G 870
852G 530
855P "THE CHEST WAS A TRAP  YOU WERE KILLED ON OPENING IT "
856GOS h,G 137
870P "A MIRROR WAS IN THE CHEST, IT WILL KILL ANY WIRWOLF YO"
871P "U MEET.",N=1,GOS h,G 530
880dP "YOUR MIRROR KILLED THE BASILISK ",GOS h,G 515
1000pAA(16*A+B)=4;GOS 1,GOS x
1010P "YOU SURVIVED THE FOREST"
1020P '"YOU WON A TREASURE TOTAL OF "Q'"CONGRATULATIONS   "'
1030G 140
2000a@=0,P $30,F I=1TO10;F J=1TO15,E=AA(16*I+J)
2005IFE=1,P "."
2010IFE=5,P "X"
2020IFE=2,P "T"
2090N ,P ',N ,R
2100xP $30,?#E0=16,R
2200xP $30''''''''''',F W=0TO4,LINK#FE22,P ',N
2201P $11$11$11$11$11,R
24001GOS x,P "YOUR COMBAT"';?#E0=16,P "STRENGTH = "C" ",$8,R
2500iP $30,F J=1TOA,P ',N ,P $11,F J=1TO15
2505E=AA(16*A+J)
2510GOS 3100
2590N ,P $30
2600F J=1TOX,P ',N ,P $11,F J=1TO15,E=AA(16*X+J)
2610GOS 3100
2635N
2640IFD=10,GOS x,P "NOTHING IN THIS AREA ",GOS h,C=C-10,GOS 1
2641IFD=10G 530
2700R
3000hF J=0TO250,WAIT,N ,R
3100IFE=1 OR E=4P " "
3110IFE=5P "X"
3120IFE=2P "T"
3130R
5000oCLEAR0,P $30'''';?#E0=10
5005P "M O N S T E R"'',?#E0=11,P "C O M B A T"''''
5100P "KILL THE MONSTERS  COLLECT THE"'"TREASURE AND SURVIVE"
5110P " THE FOREST "
5200G 15
```

SUPA*EDIT

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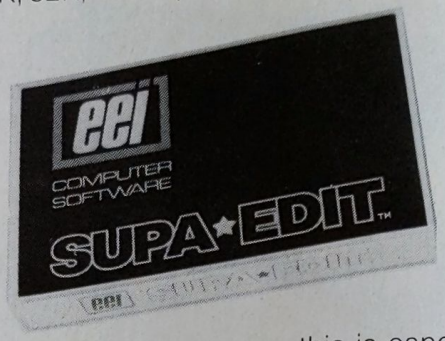

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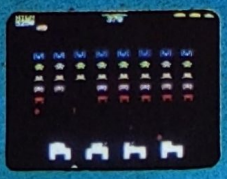

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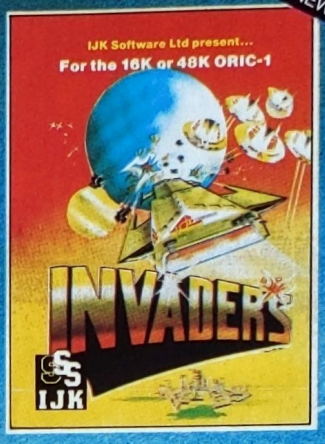

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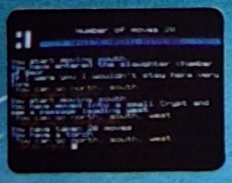

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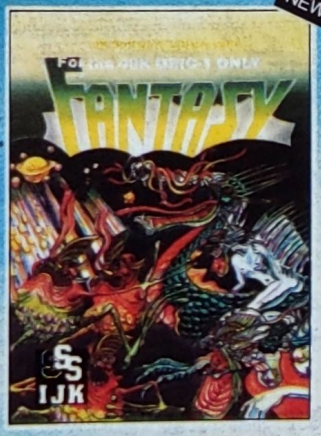

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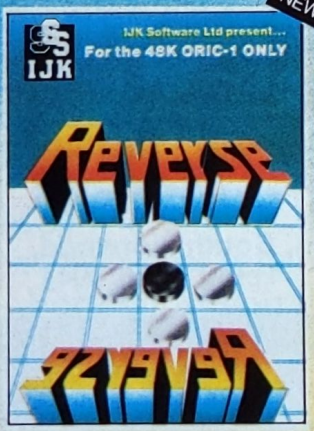

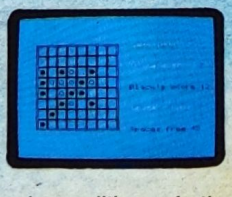

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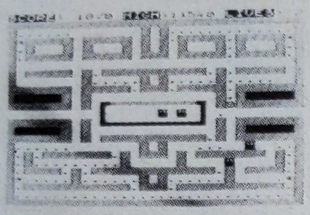

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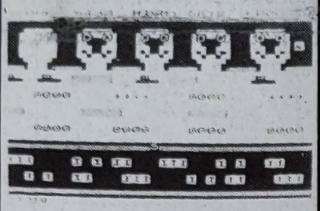

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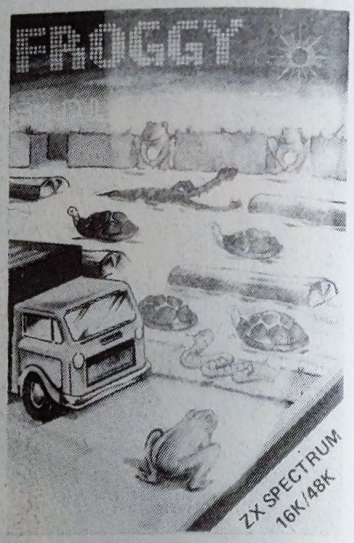

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This utility is designed to make machine code easier to use from Level II BASIC. The programs allow machine code to be entered directly in hexadecimal several bytes at a time and then called using a subverted disc command.

These utilities are 'tagged' on to Level II using disc BASIC (Level III) commands which are already present in the BASIC ROM. These commands cause jumps to addresses within the RAM where Level II keeps pointers and parameters used for housekeeping while running.

The block of RAM at 16772 (4152H) to 16803 (41A5H) called by the disc commands normally contain jumps to the BASIC error routine on initialisation. On cassette systems a syntax (v.g.) or Level III (TRS-80) error will be generated by using these commands unless they are revectored.

These commands are redirected to other routines by changing the jump addresses to point to your own routine.

On entry to any routine called in this manner register pair HL points to the next character after the disc command. It is important that on return that HL points to the next command and that the housekeeping area is not messed about with or the system is liable to crash.

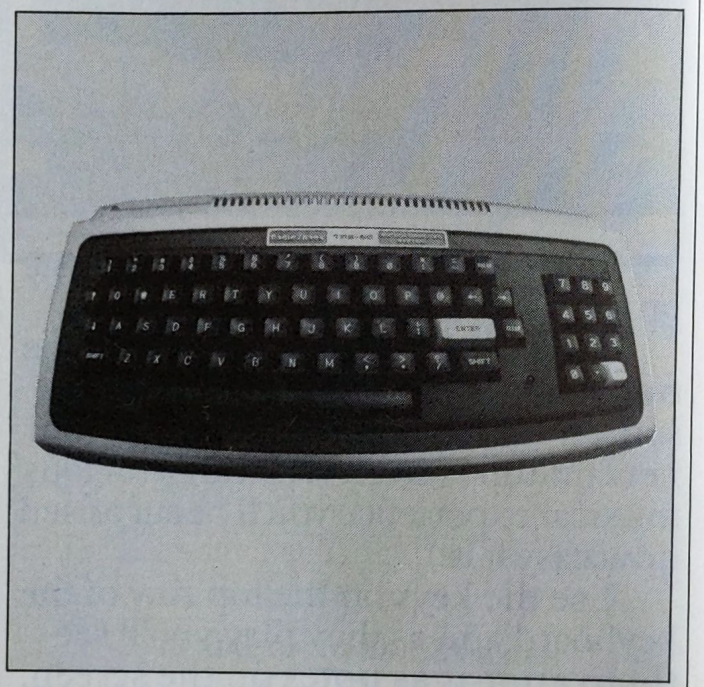
There are other locations within the RAM where the BASIC can be trapped i.e. on reset or execution which also allow the BASIC to be modified. For information see J. Farvour, Microsoft Basic decoded and other mysteries, IJF Computer Services. Also H. Howe Jr., TRS80 Assembly Language, Prentice Hall Inc.

Program Description

The program is relocatable and can be put anywhere in memory. The odd start address is because my serial print routine resides above this. Two ROM calls are used to get parameters from BASIC. These will not cause any harm to the system when used. The method used for setting the start of the program is used so that memory does not need to be reserved on power up; the program does this itself on being loaded. See lines 700-780 the disc commands are also revectored on load.

For anyone wanting to reserve memory without switching off it can be done by poking 16561 (40B1H) with the low byte of required top of memory and 16562 (40B2H) with the high byte then executing clear. Eg to reserve 255 bytes (16K system) POKE16561,0:POKE16562.127:CLEAR. N.b. the second poke wasn't really needed as 16562 is normally 127 on a 16K system.

Lines 70 — 160 allow several bytes to be POKED into memory at a time. It used the ROM POKE code for its operation. Lines 170-210 give a direct call routine instead of the clumsy USR routine. Lines 230-350 show how parameters can be passed to the users routine. Lines 360-600 will allow hexadecimal numbers to be used in basic.



These routines will give normal basic error message. To use these utilities load the program using system. Try the examples in the listing.

These utilities show how easily 'old' machines like the Video Genie and TRS80 can be changed so that their BASIC is friendlier.

PROGRAM LISTING

```
00010 ; IMPROVED M/C CALLS FOR LEVEL II
7E90                00020 TOP       EQU     7E90H     ; ARBITARY CODE IS RELOCATABL
E
2CB1                00030 POKE      EQU     2CB1H     ; LEVEL II POKE
2B02                00040 GET 64K   EQU     2B02H     ; EVAL EXP ANSWER IN DE
2B1C                00050 GET255    EQU     2B1CH     ; EVALUATE EXP ANSWER IN A
7E91                00060           ORG     TOP + 1
                    00070 ; MULTIPOKE ROUTINE
                    00080 : SYNTAC LOAD ADRESS, XX , XX , XX , XX ..... ETC , XX
                    00090 ; EG LOAD 16000,191,72,79,87,68,89,191
```

```
7E91 CDB12C  00100 LOAD      CALL    POKE      ; LEVEL II POKE
7E94 7E      00110 AGAIN     LD      A,(HL)    ; GET NEXT BYTE TO POKE
7E95 FE2C    00120           CP      ','       ; IS IT A COMMA
7E97 C0      00130           RET     NZ        ; RET IF IT ISN'T
7E98 13      00140           INC     DE        ; ADDRESS TO STORE
7E99 CDB42C  00150           CALL    2CB4H     ; USE POKE CODE IN ROM
7E9C 18F6    00160           JR      AGAIN
             00170 ; SYSTEM COMMAND FOR LEVEL II
             00180 ; SYNTAX CMD ADRESS EG CMD 457
7E9E CD022B  00190 CMD       CALL    GET64K    ; ADDRESS
7EA1 D5      00200           PUSH    DE
7EA2 C9      00210           RET               ; GO TO ROUTINE
             00220 ; * TAKE CARE TO RESTORE HL BEFORE RETURNING *
             00230 ; PARAMETERS CAN BE PASSED USING THIS CODE
             00240 ; USER    LD      B,0       ; PARAMETER COUNTER
             00250 ; NXT     LD      A,(HL)    ; HL POINTS TO BASIC PR.
             00260 ;         CP      ','       ; IS IT COMMA
             00270 ;         JR      NZ,TEST
             00280 ;         INC     B
             00290 ;         CALL    GET64K    ; GET PARAMETER EXP
             00300 ;         PUSH    DE        ; SAVE IT ON STACK
             00310 ;         JR      NXT
             00320 ; TEST    LD      A,PAR     ; PAR = NO OF EXPECTED VALUES
             00330 ;         CP      B
             00340 ;         JP      NZ,1997H  ; FORCES SYNTAX ERROR
             00350 ; REST OF USER CODE
             00360 ; HEXADECIMAL ROUTINE FOR LEVEL II
             00370 ; SYNTAX & HEX NO EG &FFE0
7EA3 EB      00380 HEX       EX      DE,HL
7EA4 210000  00390           LD      HL,0
7EA7 13      00400 NEXT      INC     DE        ; GET NEXT CHAR
7EA8 1A      00410           LD      A,(DE)
7EA9 EE30    00420           XOR     30H       ; GET 0-9 BY MASKING OUT
7EAB FE0A    00430           CP      0AH       ; HIGH BITS.
7EAD 380A    00440           JR      C,X16     ; GO IF 0 - 9
7EAF EE70    00450           XOR     70H       ; GET A-F BY MASKING
7EB1 2811    00460           JR      Z,FINISH  ; IS IT @
7EB3 C609    00470           ADD     A,9       ; MAKE IT BINARY
7EB5 FE10    00480           CP      10H
7EB7 300B    00490           JR      NC,FINISH ; NOT A-F
7EB9 29      00500 X16       ADD     HL,HL     ; MULTIPLY BY 16
7EBA 29      00510           ADD     HL,HL
7EBB 29      00520           ADD     HL,HL
7EBC 29      00530           ADD     HL,HL
7EBD DAB207  00540           JP      C,07B2H   ; OVERFLOW ERROR LEVEL II
7EC0 B5      00550           OR      L
7EC1 6F      00560           LD      L,A       ; PUT VALID CHAR IN HL
7EC2 18E3    00570           JR      NEXT
7EC4 D5      00580 FINISH    PUSH    DE        ; SAVE CODE POINTER
7EC5 CD9A0A  00590           CALL    0A9AH     ; MAKE INTEGER AND SAVE
7EC8 E1      00600           POP     HL        ; RESTORE HL
7EC9 2B      00610           DEC     HL
7ECA D7      00620           RST     10H       ; GET NEXT CHAR
7ECB C9      00630           RET               ; BACK TO BASICS
4188         00640           ORG     4188H     ; ADDRESS DISK LOAD COMMAND
4188 C3917E  00650           JP      LOAD
4173         00660           ORG     4173H     ; ADDRESS DISK CMD COMMAND
4173 C39E7E  00670           JP      CMD
4194         00680           ORG     4194H     ; ADDRESS DISK & COMMAND
4194 C3A37E  00690           JP      HEX
             00700 ; AUTO SET MEMORY SIZE FOLLOWS
40B1         00710           ORG     40B1H     ; HIMEM POINTER
40B1 907E    00720           DEFW    TOP
40D6         00730           ORG     40D6H     ; TOP STRING AREA
40D6 907E    00740           DEFW    TOP
40A0         00750           ORG     40A0H     ; BOTTOM STRING AREA
40A0 5E7E    00760           DEFW    TOP-50    ; CLEAR 50
40E8         00770           ORG     40E8H     ; STACK POINTER
40E8 5C7E    00780           DEFW    TOP-52
0072         00790           END     72H

00000 TOTAL ERRORS
AGAIN  7E94
FINISH 7EC4   LOAD   7E91
X16    7EB9   GET255 2B1C
NEXT   7EA7   GET64K 2B02
HEX    7EA3   POKE   2CB1
CMD    7E9E   TOP    7E90
```

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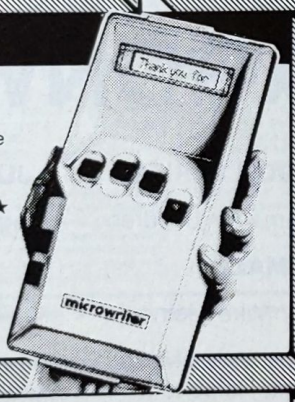

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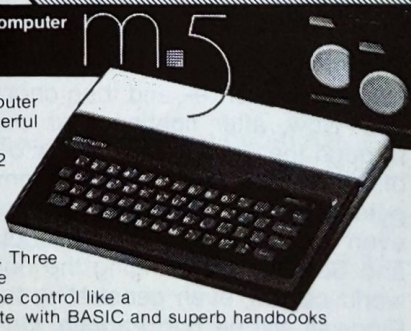

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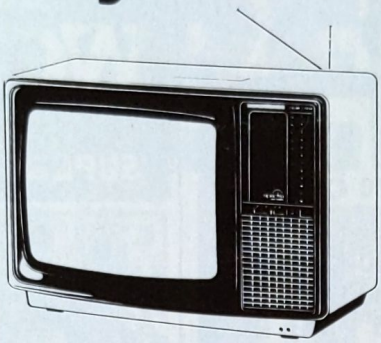

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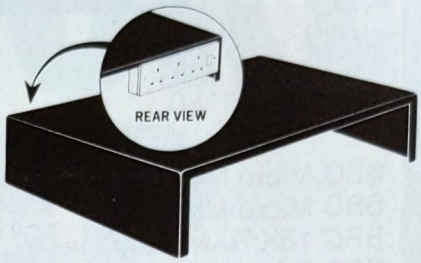

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...yet with all this, only 10% of the user memory will have been taken up. 90%(or 95% in the 32K option) of the entire original RAM will still be available for you to use in any way you want.

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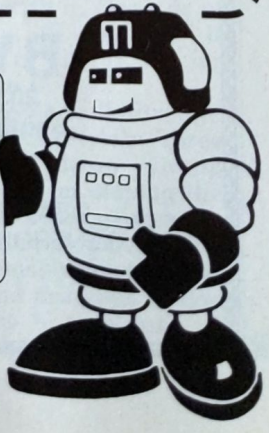

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They came suddenly — without warning — they attacked our planet — viciously and without mercy — the remnants of human kind were scattered throughout the Galaxy — the outsiders took our planet for themselves — built huge ugly cities deep underground — each city housed their ultimate power units — although it has taken 10,000 of your years we have gathered together and developed a ship capable of flying through their defences — we request you fly this ship and deliver the deadly missile into the heart of each and every city you can find — destroy the outsiders and give us back our beloved planet. This is not an easy mission. Complete it and we shall be eternally grateful.

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for the 48K Spectrum only **£5.95**

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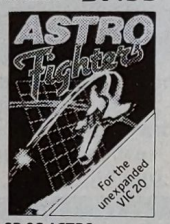

SP.06 ASTRO FIGHTERS A space duel played by two players at once. Requires Joystick. M/code. **£6.95**

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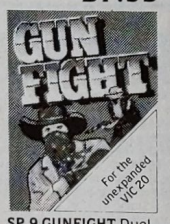
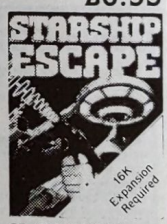


SP.9 GUNFIGHT Duel with a deadly hombre in a western shootout play the computer or 2nd player. Joystick or keyboard. M/code. **£6.95**

SP.10 SPACE RESCUE Pilot your rescue craft through the asteroid belt and save the stranded crew. Joystick or keyboard. M/code. **£6.95**



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LOOK BEFORE YOU LEAP

Sue Denham visits Microstyle in Newbury.

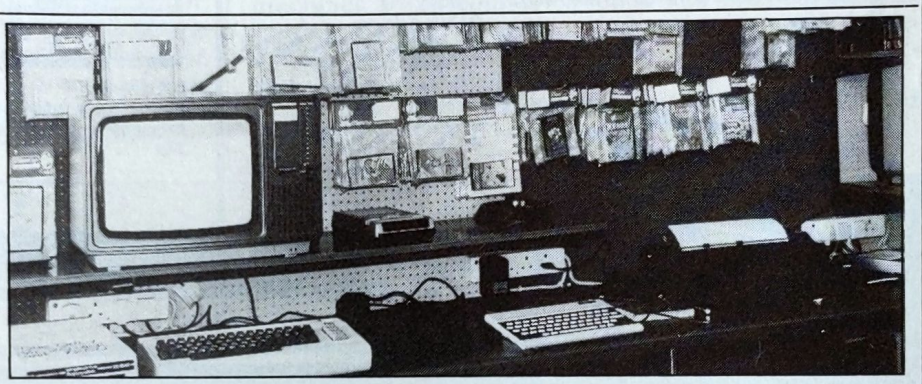
Since the first in the growing MicroStyle chain of computer dealer shops opened its doors to the public two years ago business has gone from strength to strength with the third shop opening during the first week of July, and a fourth to be opened in September.

Headed by Lyn Farmer the shops, now in Bath, Newbury and Daventry, specialise in providing products for entertainment in home computers. Machines they cover are the BBC Micro, which Lyn reckons is the best selling computer in her shop, the Commodore 64 and VIC 20, Oric, Sord M5 and as soon as it is released, the Acorn Electron.

The Newbury shop I visited has a very informal yet organised atmosphere with a couple of assistants on hand to offer you coffee while you have a chat about your computer and software. Lyn says she prefers the women who run her shops not to have any programming experience. This might sound odd, but according to Lyn much of the work they do as shop manager involves administrative duties like cataloguing newly arrived products, recording those machines sent back to manufacturers, liaising with hardware and software manufacturers to name but a few.

Don't be put off by this. Tucked away in an outer office of the shop are a couple of computer engineers whose job it is to comprehensively brief all staff employed in the branch. If there is a question posed by a customer which the assistants are unable to answer they either refer them to the engineers, or say they will find out what the solution to their problem is.

Lyn is well aware of the need for after sales service and for this reason they have adopted a new



service department at the Newbury office which will be the central core of the firm's service arrangements. 'There are a lot of people who bought BBC Micros from the word go and whose guarantees are now running out. We want to make sure we are keeping customers by offering a new extended guarantee to those people.' said Lyn.

'That way we hope that not only will we keep our own customers satisfied but we will also pick up people who have bought their computers from elsewhere.'

In each shop you will find a range of computers hooked up to a television or monitor which are there purely for demonstration purposes. If you go into the shop wanting to see the performance of a particular computer or a piece of software that has caught your eye you are at liberty to do so.

Lyn's main approach is to keep her customers happy. That's why she and her fellow director have regular meetings to decide which new computers to stock in the stores or which to drop from their current lists, and which firm's software to store. If customers want a particular product in large enough quantities Lyn reckons it must be worth stocking and does her best to do so.

As well as selling software (both games and utility packs) you'll find a complete range of books and magazines for machine dedicated users and those with a more general interest in computers.

With the current plethora of computer software now available for the home computer market it is a difficult choice for dealers to make as far as stocks go. Lyn has worked what she believes to be a successful formula for her chain of shops.

This is to give every piece of software which arrives through the office door to one of the firm's engineers to test. He evaluates it, providing it runs on one of the machines MicroStyle stocks for sale and gives it a rating accordingly. Once he has had his hands on it Lyn whisks it away and lets her seven year old son play with it. Her rule of thumb is to say, 'If he likes it everyone will like to play it.' So far this seems to have worked.

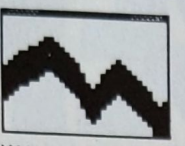
All sorts of people walk through the doors of MicroStyle's three branches ranging from young school-children bent on playing the latest game to the older generation or victims of unemployment and suddenly find themselves with time on their hands and are keen to find out about this new 'hi-tech' era.

An Exciting range for 16K ZX81 from SOFTWARE FARM

SUPER SCRAMBLE

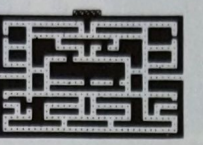
YOUR MISSION
To penetrate the witches defences, enter her cavern and destroy her wicked heart.

THE WITCHES DEFENCES
Stalagmites and stalactites - which grow across your path.
Volcanoes - to get past alive - if you can!
Vampire Bats - that cling to your ship and make controls sluggish
Cave-ins - should you hit the side of the cave with your Laser Cannon or Bomb, part of the roof will cave in on you



- Written entirely in machine code
- Hall of Fame
- 1 or 2 players
- Mystery score positions to bomb
- 5 skill levels

GOBBLERS Mk 2



Beat that high score!
Gobble those dots before those meanies gobble you!
Your only aids are four 'Power Pills' which make the meanies edible. But not for long!

- Machine coded for fast action
- Extra 'Gobbler' for 10,000 points
- On screen scoring
- High score with enter name facility
- Up to 4 players

Improved Mk 2 version!

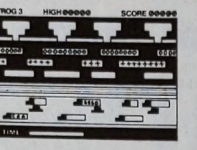
ASTEROIDS

Stay alive as long as possible in open space filled with flying rocks. Score by shooting them - which also causes them to break into lots of little bits and makes life even worse!

- Machine coded for fast action
- On screen scoring
- High score with enter name facility
- Up to 4 players
- Extra ship for 1,000 points (not as easy as it sounds!)
- Ship moves just like arcade version
- Rotate left/rotate right/thrust
- Fires in all 8 directions
- Increasing number of asteroids
- Three asteroid sizes
- Alien spaceship (fires back!)

All games £5.95 each

NEW! FROG HOPPER



Jump your frog over the lanes in the road - preferably without being turned into jam by the approaching traffic! Then cross the river by hitching a few rides on some passing logs and finally into the safety of your hole on the opposite bank. Once all 'Frog Holes' have been filled you start again with a different pattern and a bonus frog.

- 50 Skill levels!
- Played against the clock - froggie only has a short while to live!

when more than one game purchased deduct £1.00 from each tape!

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Design Dept THE SOFTWARE FARM, Craigo Farm, Botany Bay, Tintern, Gwent

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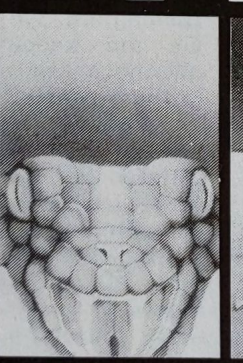

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Feed your hungry snake and watch him grow.... beware the rocks
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FACTFILE

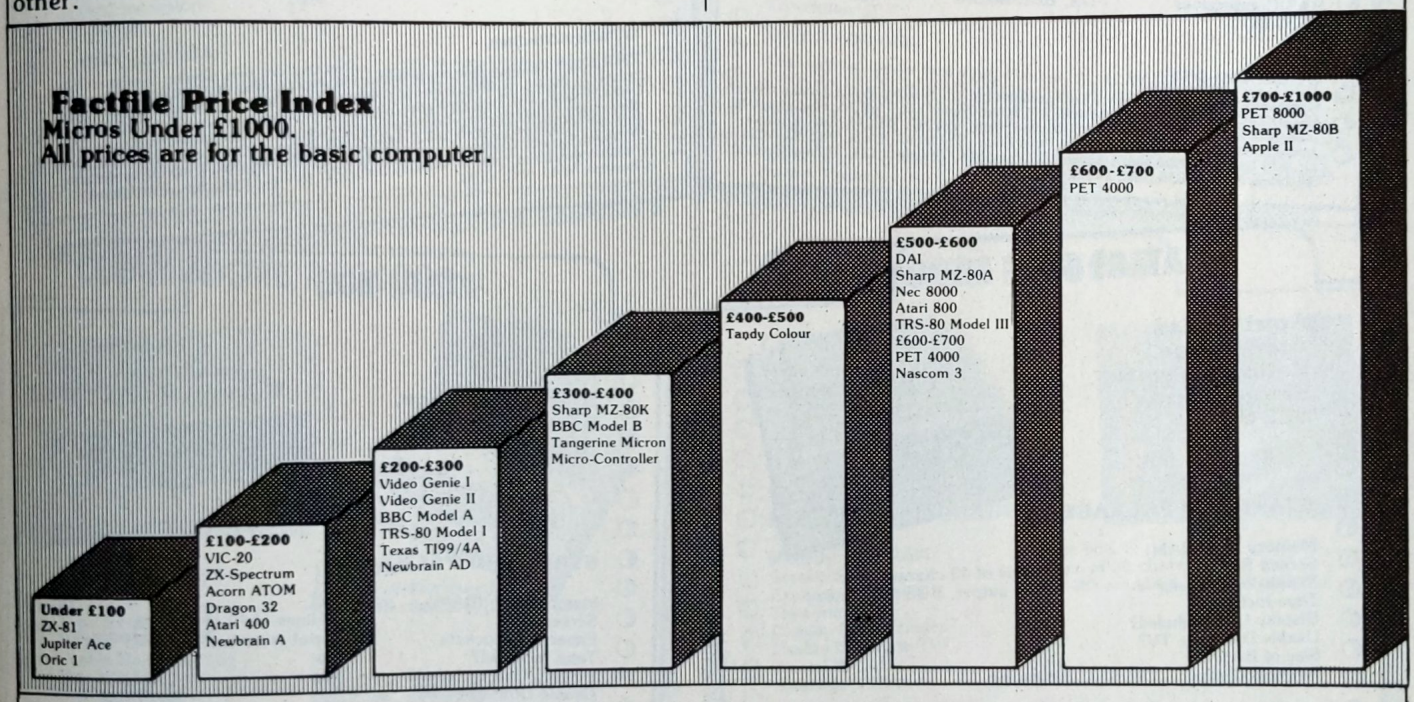
MICRO FACTFILE

Factfile is our regular buyer's guide to microcomputers. Herein you will find all the important facts and figures on 28 of the most important micros on the market under £1000. The idea is that you are able to directly compare what different manufacturers are offering you and how much they are charging you for it. Many brochures and adverts bury the reader in a mass of irrelevant facts and figures, which make it difficult to judge one against the other.

Factfile sorts it all out for you!

Just look down the price index to discover which machines are in your price-range and then consult the 'cards' on each. All the information is in a standard form and has all been checked by our technical staff. The section is presented alphabetically.

As new machines become available, we will add them into the FACTFILE as soon as we can.



Factfile

RAM: Stands for Random Access Memory and it is in there to accept the user's programs. Amount of memory is measured in "thousands of bytes" or "K" ie, 8K. A byte is a computer 'word' or single piece of information, made up of eight 'bits' which are just 1 or 0. Hence you need thousands of bytes to store a reasonable size program, since each letter, number, full stop, comma, line number, etc, uses up computer 'words' quite rapidly.

As a guideline – you can get about 50 program lines into 1K and 250 into 8K. This is a rough estimate – don't take it literally! The figures are not straight multiples, because you need to allow the machine space to work on your listing, once you've typed it in.

ROM: Read Only Memory. The machine can look and see what is stored in the memory, but it cannot alter the contents, nor store anything new. Generally used for control programs, where the micro consults the memory to see what to do next at various points in the program. Languages, such as BASIC, are stored in ROM and allow the machine to interpret what you type in, in terms of its own 'machine code'.

SIZE OF BASIC: The number of bytes occupied by the BASIC language is important, as it is an approximate guide to the BASICs versatility. The more powerful the language, the easier it should be to use.

BUS CONNECTION: A socket on the micro which allows it to be linked up to various add-ons. This can take the form of many various items, ie, expansion box, printer, disc drives, plotting device. In short a BUS is an information 'window' through which the micro communicates with the outside world.

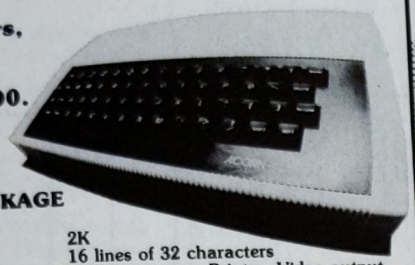
SERIAL/PARALLEL OUTPUT: This refers to the manner in which the micro transmits data to other units. If it puts out information in a long string, one bit after another, down a single wire or connector, it is a serial output. Parallel output is where pins or wires carry information simultaneously and are 'read' together as a block by whatever it is the micro is communicating with.

VIDEO OUTPUT: an output which will drive a monitor, as opposed to a TV set, allowing it's use as a screen for the computer.

FACTFILE

ACORN ATOM

Acorn Computers,
4A Market Hill,
Cambridge.
Tel: 0223-245200.



STANDARD PACKAGE

Memory Size (RAM)	2K
Screen Size	16 lines of 32 characters
Expansion Sockets	BUS connector, Printer, Video output
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£140 kit, £174.50 built**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	12K internal, 32K external options	£45-149
Printer	Yes	£232
Monitor	No	–
Disc Drives	Yes	£299
Other Languages	Yes	£11.50
Multi-user Capabilities	Yes	–
BASIC extensions (Toolkits)	Yes, BBC BASIC	£50

OTHER ADD-ONS:

Centronics-type connector, Technomatic Ltd, 17 Burnley Road, London NW10, £8.50; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **DUO-1 64K add-on,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £64 kit, £70 built; **MZ163 RAM expansion boards,** Timedata Ltd, 57 Swallowdale, Basildon, Essex SS15 5BZ, £59.50-76.

APPLE II

Apple Computer (UK) Ltd,
Finway Road,
Hemel Hempstead,
Herts, HP2 7PS

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 40 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8 or 12K
Average Price	**£812**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	–
Printer	Yes various	£200-1700
Monitor	Yes	£134
Disc Drives	Yes	£379
Other Languages	Yes	£84-500
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	Yes	£26

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Multifunction Card,** Datex Micros, 193 Touring Road, Worthing, W. Sussex, £85; **5¼" Winchester disc drive,** Independent Computer Engineering Ltd 16/18, Littleton Road, Ashford, Middlesex, TW15 1UQ; **16K RAM Board,** DDP Research & Marketing, 17 Novel Square, Basildon, Essex, SS13 1LP, £75; **U-port, 8 serial interfaces,** U-Microcomputers, Ltd, Winstanely Industrial estate, Long Lane, Warrington, Cheshire, WA2 8PR, £195.

ATARI 400

Atari UK Ltd,
Atari House,
Railway Terrace,
Slough, Berks
SL2 5BZ.

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output, BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£149.99**

MANUFACTURER'S EXPANSIONS

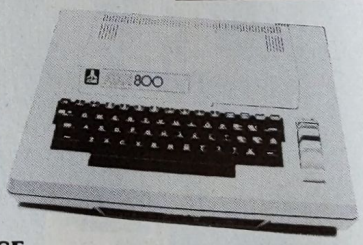
	DETAILS	PRICE
RAM	No	–
Printer	Yes	£199.90
Monitor	No	–
Disc Drives	Yes	£299.99
Other Languages	Yes	£39-79
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	Yes	TBA

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microctonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95

ATARI 800

Atari UK Ltd,
Atari House,
Railway Terrace,
Slough, Berks
SL2 5BZ.



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output, BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£399.95**

MANUFACTURER'S EXPANSIONS

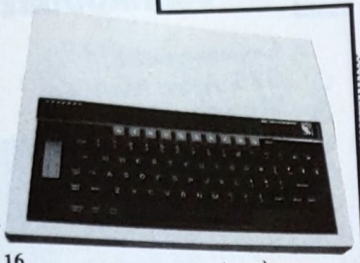
	DETAILS	PRICE
RAM	Yes	£199.99
Printer	No	–
Monitor	Yes	£299.99
Disc Drives	Yes	£39.79
Other Languages		
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	Yes	TBA

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Carrying case,** CJE Microcomputer, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50

BBC MICROCOMPUTER

BBC Model A,
BBC Microcomputer Systems,
PO Box 7,
London W3 6JX.



STANDARD PACKAGE

Memory Size (RAM)	16
Screen Size	32 lines of 40 characters (max)
Expansion Sockets	Parallel serial output, analogue output, Bus connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£299**

MANUFACTURER'S EXPANSIONS

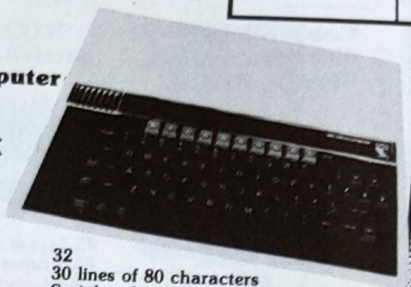
	DETAILS	PRICE
RAM	up to 32K	£100
Printer	TBA	—
Monitor	Yes	£200
Disc Drives	TBA	—
Other Languages	TBA	—
Multi-user Capabilities	Yes	—
BASIC extensions (Toolkits)	TBA	—

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35 Walnut Street Close, Guildford, Surrey GU1 4UN, Tel: 0483 50321, £199-799; **BBC Cassette Recorder,** Microage Electronics, 135 Hale Lane, Edgeware, Middx, £28; **Colour Monitor,** PortaTel Conversions Ltd, 25 Sunbury Cross Centre, Staines Roach West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Newitt House, Northgate Street, Bury St. Edmunds, Suffolk IP33 1HQ, £95.00; **Analogue Joystick, Light Pen,** Stack Computers, 290-298 Derby Road, Bootle, Liverpool.

BBC MICROCOMPUTER

BBC Model B
BBC Microcomputer Systems,
PO Box 7,
London W3 6JX



STANDARD PACKAGE

Memory Size (RAM)	32
Screen Size	30 lines of 80 characters
Expansion Sockets	Serial and parallel output, analogue output, printer BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£399**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	TBA	TBA
Monitor	No	—
Disc Drives	TBA	TBA
Other Languages	TBA	TBA
Multi-user Capabilities	Yes	—
BASIC extensions (Toolkits)	TBA	TBA

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, Tel: 0483 503121, £199-799; **BBC Cassette recorder,** Microage Electronics, 135 Hale lane, Edgware, Middx, HA8 9QP, £28; **Colour Monitor,** Portatel Conversions Ltd, 25 Sunbury Cross Centre, Saires Road West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Hewitt House, Northgate Street, Bury St. Edmunds, Suffolk, IP33 1HQ, £95.00; **Carrying Case,** CJE Microcomputers, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50.

COMMODORE PET 4000

Commodore,
675 Ajax Avenue,
Slough, Berks

STANDARD PACKAGE

Memory Size (RAM)	16 or 32K
Screen Size	25 lines of 40 characters
Expansion Sockets	IEEE 488 standard, parallel output
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£632.50, £799.25**

MANUFACTURER'S EXPANSIONS

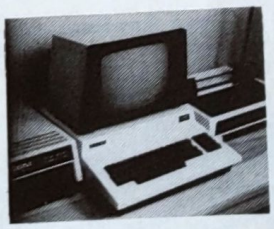
	DETAILS	PRICE
RAM	No	—
Printer	Yes several	£454-1604
Monitor	N/A	—
Disc Drives	Yes	£396
Other Languages	Yes, single or dual	£454-1029
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Universal Interface, Technomatic Ltd, 17 Burnley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way industrial Estate, Ashford, Kent, £82.95; **64K DRC Module,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

COMMODORE PET 8000

Commodore,
675 Ajax Avenue,
Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	32K or 96K
Screen Size	25 lines of 80 characters
Expansion Sockets	IEEE 488 standard, parallel output
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£980, £1374**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£454-1604
Monitor	N/A	—
Disc Drives	Yes single or dual	£454-1029
Other Languages	Yes	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

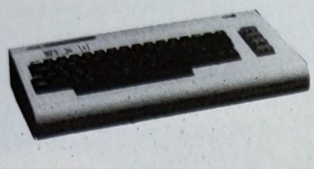
Universal Interface, Technomatic Ltd, 17 Bunley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way industrial Easte, Godinton Road, Ashford, Kent, £82.95; **64K DRC Module** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

REFERENCE

FACTFILE

COMMODORE VIC20

Commodore,
675 Ajax Avenue,
Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	5K
Screen Size	23 lines of 22 characters
Expansion Sockets	BUS connection, Disc, Printer, Serial output, joystick
Tape Included?	Yes
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£129.99**

MANUFACTURER'S EXPANSIONS

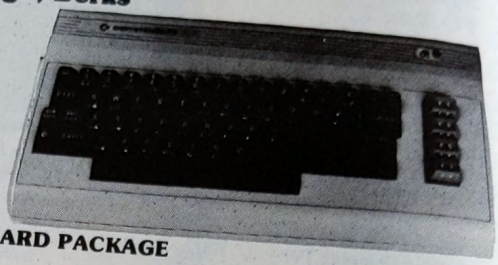
	DETAILS	PRICE
RAM	3K,8K,16K expansion options	£30,£45,£75
Printer	Yes	£270
Monitor	No	—
Disc Drives	Yes	£396
Other Languages	Yes	£38.95
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

VCR-20,
20K RAM cartridge, Audio Computers, 87 Bournemouth Park Road, Southend on Sea SS5 2JJ, £39 kit, £45 built; **Expansion Board,** 3K-16K, Arfon Microelectronics Ltd, Gibyn Industrial Estate, Caernafon, Gwynedd, Wales LL55 2BD, £220. Languages: VIC Forth, Adda Computers, 154 Victoria Road, Acton, London, W3.

COMMODORE 64

Commodore,
675 Ajax Avenue,
Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	64K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS, Serial, Video
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£350**

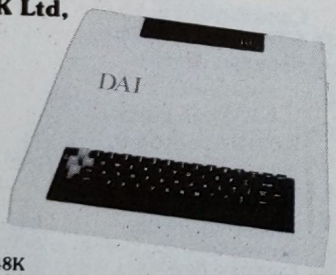
MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	£230-276
Monitor	No	—
Disc Drives	Yes	£299
Other Languages	Yes	—
Multi-user Capabilities	Yes	—
BASIC Extensions	Yes	—
OTHER ADD-ONS:		

Light Pen, 4 slot motherboard, Joystick, RS232 Interface, Stack Computers, 290-298 Derby Road, Bootley Liverpool. 051-933 5511..

DAI

Data Applications UK Ltd,
16B Dyer Street,
Cirencester,
Gloucestershire,
GL7 2PF



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 60 characters
Expansion Sockets	BUS connection, Serial output, joystick socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£575**

MANUFACTURER'S EXPANSIONS

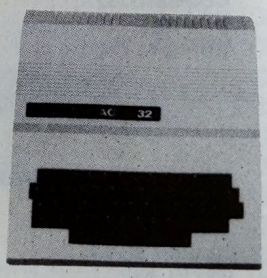
	DETAILS	PRICE
RAM	No	—
Printer	No	—
Monitor	No	—
Disc Drives	Yes	TBA
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes, maths pack	£149

OTHER ADD-ONS:

None Reported

DRAGON 32

Dragon Data Ltd
Queensway,
Swansea
Industrial Estate,
Swansea, SA5 4EH



STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	16 lines of 32 characters
Expansion Sockets	Yes
Display Unit Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£199**

MANUFACTURER'S EXPANSIONS

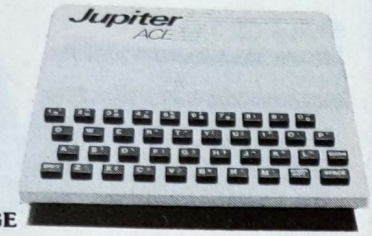
	DETAILS	PRICE
RAM	—	—
Printer	No	—
Monitor	No	—
Disc Drives	No	—
Other Languages	Yes	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Joystick, Light Pen, 4 slot motherboard, Stack Computers 290-298 Derby Road, Bootle, Liverpool. 051-933 5511.

JUPITER ACE

Jupiter Cantab
22 Foxhollow
Bar Hill
Cambridge
CB3 8EP



STANDARD PACKAGE

Memory Size (RAM)	3K
Screen Size	24 lines of 32 characters
Expansion Sockets	Not known
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	Resident language is FORTH at 8K
Average Price	**£89.95**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	TBA	–
Printer	TBA	–
Monitor	TBA	–
Disc Drives	TBA	–
Other Languages	TBA	–
Multi-User Capabilities	TBA	–
BASIC extensions (toolkits)	TBA N/A	– –

OTHER ADD-ONS:

None Reported.

NASCOM 3

Lucas Logic, NASCOM
Microcomputers Division,
Welton Road,
Wedgenock Industrial
Estate,
Warwick, CV34 5PZ.
Tel: 0926-497733

STANDARD PACKAGE

Memory Size (RAM)	0-48K
Screen Size	25 lines of 40 or 80 character
Expansion Sockets	Parallel & serial outputs, BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8-10K
Average Price	**£549**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 48K (max)	£130
Printer	Yes	£215-1285
Monitor	Yes	£99-120
Disc Drives	Yes, single or dual	£470-685
Other Languages	Yes	£50
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	Yes	-15-50

OTHER ADD-ONS:

Olivetti disc drives, single and dual, Kram Electronics, Victoria House, 17, Highcross St., Leicester, LE1 4PF, £179-349; **A/D Board,** 10, Research Ltd, 6, Laleham Avenue, Mill Hill, London NW7 3HL, £120 + VAT; **Hobbit – mini-cassette system,** Ikon Computer Products, Kiln Lane, Laugharne, Covnathen, Dyfed, £99 + VAT; **Disc drives, single and dual,** Micro-Spares, 19, Roseburn Terrace, Edinburgh, EH12 5N9, £199-279.

NEWBRAIN

Grundy Business
Systems Ltd,
Grundy House,
Somerset Road,
Teddington
TW11 8TD.

STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	25 lines of 40 or 80 characters
Expansion Sockets	Printer, serial, video, data bus
Tape Included?	No
Display Unit Included?	No (Single line option on model AD)
Usable Domestic TV?	Yes
Size of BASIC	18K
Average Price	**£199 model A, £299 Model AD**

MANUFACTURER'S EXPANSIONS

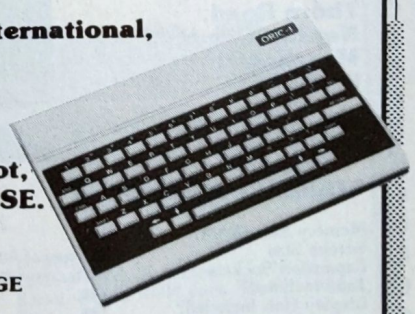
	DETAILS	PRICE
RAM	64 – 512K,	£75 – £445
Printer		
Monitor		
Disc Drives	NYA	–
Other Languages	NYA	–
Multi-user	NYA	–
BASIC extensions	NYA	–

OTHER ADD-ONS:

None Reported.

ORIC 1

Oric Products International,
Coworth
Mansion,
Coworth Park,
London Road,
Sunninghill, Ascot,
Berkshire, SL5 7SE.



STANDARD PACKAGE

Memory Size (RAM)	16K, 48K
Screen Size	28 X 40
Expansion Sockets	Yes
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£99, £169**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	N/A	–
Printer	TBA	–
Monitor	No	–
Disc Drives	TBA	–
Other Languages	N/A	–
Multi-user Capabilities	No	–
BASIC extensions	TBA	–

OTHER ADD-ONS:

REFERENCE

FACTFILE

SHARP MZ-80A

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester
M10 9BE
Tel: 061-205 2333

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£549**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	–
Printer	Yes	£450-800
Monitor	N/A	–
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	No	–

OTHER ADD-ONS:

None Reported

SHARP MZ-80B

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester M10 9BE

STANDARD PACKAGE

Memory Size (RAM)	64K
Screen Size	25 lines of 40 or 80 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	16K
Average Price	**£990**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	Yes	£120
Printer	Yes	£450-800
Monitor	N/A	–
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	No	–

OTHER ADD-ONS:

Multi-vision and triple-vision, Datron Micro Centre, 2 Abbeydale Road, Sheffield S7 1FD, £35-79

SHARP MZ-80K

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester
M10 9BE

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£350**

MANUFACTURER'S EXPANSIONS

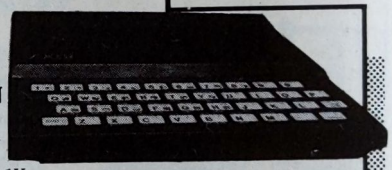
	DETAILS	PRICE
RAM	No	–
Printer	Yes	£450-800
Monitor	N/A	–
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45 upwards
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	No	–

OTHER ADD-ONS:

None Reported

SINCLAIR ZX 81

Sinclair Research,
6 Kings Parade,
Cambridge CB2 1SN



STANDARD PACKAGE

Memory Size (RAM)	1K
Screen Size	24 lines of 32 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£49.95 built**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K RAM pack	£29.95
Printer	ZX Printer	£59.95
Monitor	No	–
Disc Drives	No	–
Other Languages	No	–
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	No	–

OTHER ADD-ONS:

Memory expansion unit 16K or 64K, Memotech Ltd, 3 Collins St, Oxford OX4 1XL, £39.95-79; Memory Expansion 64K, Downsway Electronics (UK) Ltd, Dept M, Downsway House, Epsom Road, Ashtead, Surrey; £59.95; **Key Bleep Unit,** Microtronix, 3 Buxton Avenue, Coulton, Nottingham, N94 3RR, £8.85 kit, £9.95 built; **Maximem 1.1,** East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London, EB4 BT, £93.50; **Music Synthesiser + 16 line control port,** William Stuart Systems Ltd, Dower House, Billicicay Road, Herongate, Brentwood, Essex CM13 3SD, £19.50; **Full-size keyboard,** Protos Computer Systems, Frome Computing, 20 Ashtree Road, Frome, Somerset, BA11 2SF, £64.95; **ZX99 Automatic tape control,** Data-cassette, 44, Shroton Street, London NW1 6UG, £59.95.

SINCLAIR ZX SPECTRUM

Sinclair Research,
6 Kings Parade,
Cambridge, CB2 1SN

STANDARD PACKAGE

Memory Size (RAM)	16-48K
Screen Size	24 lines of 32 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	10K
Average Price	**£125 or £175**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	48K RAM for 16K version	£60
Printer	ZX Printer	£59.95
Monitor	No	—
Disc Drives	ZX Microdrive	TBA
Other Languages	No	—
Multi-user Capabilities	No	TBA
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Memory Expansion 32K, Downsway Electronics (UK) Ltd, Dept M, Downsway House, Epsom Road, Ashtead, Surrey; £42.50

TANDY TRS 80 I

Tandy Corporation,
12th Floor,
Tameway Tower,
Walsall,
West Midlands
WS1 1LA.

STANDARD PACKAGE

Memory Size (RAM)	4 or 16K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8 or 12K
Average Price	**£229 or £339**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	32K extra in expansion unit	£349
Printer	Yes	£239-1200
Monitor	Yes	£100
Disc Drives	Yes	£369
Other Languages	Yes	£100
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

Disc drives, single and dual, Cumana Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kran Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179-349; **48K internal RAM,** General Northern Microcomputers, (GNOMIC) 46 Middle Street, Blackhall, Marlepool, Cleveland, £70 + VAT; **32K RAM card,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

TANDY TRS 80 III

Tandy Corporation,
12th Floor,
Tameway Tower,
Bridge Street,
Walsall,
West Midlands,
WS1 1LA

STANDARD PACKAGE

Memory Size (RAM)	4-48K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connection, parallel & serial output
Tape Included?	No
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	16K
Average Price	**£599-1799**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K modules	£70
Printer	Yes various	£239-1200
Monitor	N/A	—
Disc Drives	Yes	£600
Other Languages	Yes	£100
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

Disc drives, Cumara Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17, Highcross St, Leicester LE1 4PF, £179-349; **48K internal RAM,** General Northern Microcomputers, (GNOMIC), 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; **32K RAM card,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

TANDY COLOUR

Tandy Corporation,
12th Floor,
Tameway Tower,
Bridge Street,
Walsall,
West Midlands
WS1 1LA

STANDARD PACKAGE

Memory Size (RAM)	16-32K
Screen Size	16 lines of 32 characters
Expansion Sockets	Serial output, ROM pack, joystick socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8-16K
Average Price	**£499**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£239-1200
Monitor	No	—
Disc Drives	Yes	£439
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Olivetti disc drives single and dual, Kram Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179-349.

FACTFILE

TEXAS TI 99/4A

**Texas Instruments,
European
Consumer
Division,
Manton Lane,
Bedford MK41 7PA**

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 32 characters
Expansion Sockets	ROM pack, Bus connector, joystick, socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	14K
Average Price	**£199**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 48K (max)	£300
Printer	Yes	£275
Monitor	No	—
Disc Drives	Yes	£300
Other Languages	Yes	£50-£100
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

Speech Synthesiser, Texas Instruments, £46.60; **Terminal Emulator II,** Texas Instruments, £37.80; **RS232 Interface,** Texas Instruments.

COLOUR GENIE

**Lowe Computers,
Bently Bridge,
Chesterfield Road,
Matlock
Derbyshire DE4 5LE
Tel: 0629 4995/4057**

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Parallel & serial output, expansion BUS
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£194**

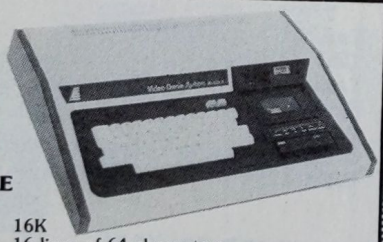
MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K	£38.56
Printer	Yes	£220
Monitor	No	—
Disc Drives	No	—
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

VIDEO GENIE I

**Lowe Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire,
DE4 5LE**



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	16 lines of 64 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	12K
Average Price	**£279**

MANUFACTURER'S EXPANSIONS

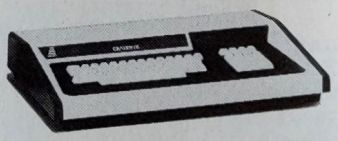
	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69-99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17 Highcross St, Leicester LE1 4PF, £179-349; **EG3014 Expansion box with 16K/32K RAM,** Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199-213 **48K Internal RAM,** General Northern Microcomputers, GNOMIC, 46 Middle Street, Blackhall, Martlepool, Cleveland, £70 + VAT: **32K RAM Card** Audio Computer, 87 Bournmouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

VIDEO GENIE II

**Lowe Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire DE4 5LE**



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	13K
Average Price	**£299**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69-99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

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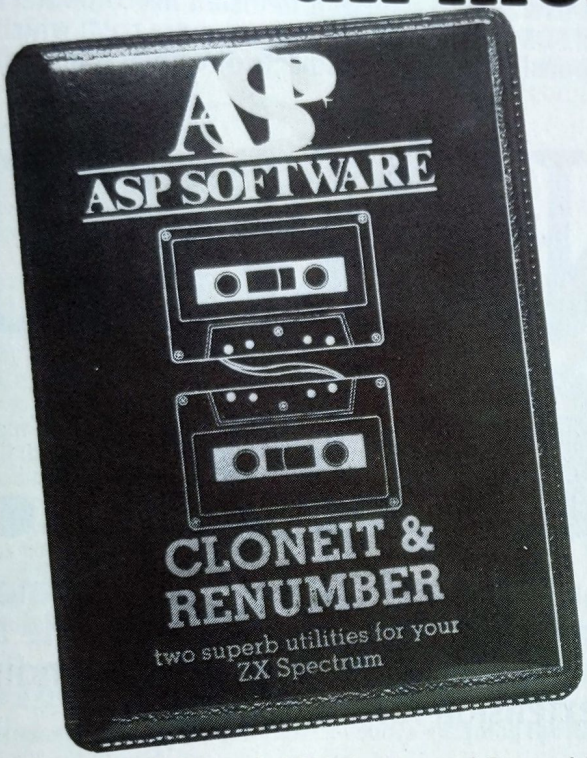

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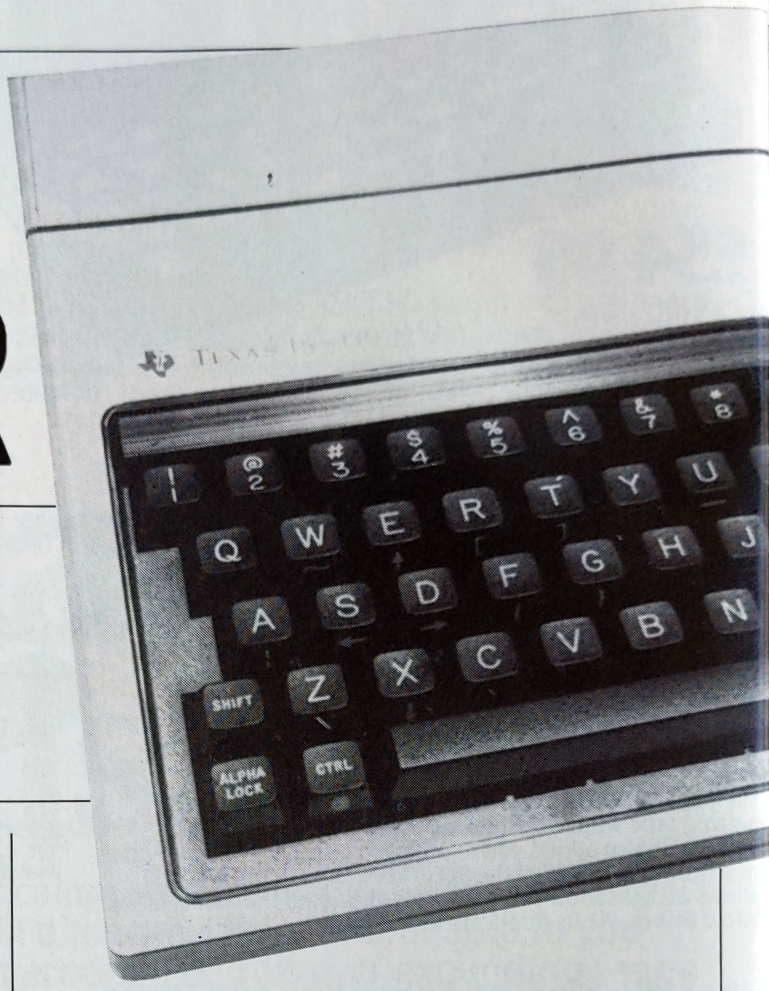
SOFTWARE

HI-RES EDITOR



Explore new areas of graphic design on your Texas with P. Strassen's editor program

Creating large pictures on screen using defined characters usually means sitting down with a piece of graph paper and working things out the hard way. Using this program you can create your large shape by editing the characters on-screen and then transferring them to a different part of the screen to build up the shape.

The screen contains two bordered blocks. One of these is used to define the characters and the other is used to build up the 'macro' shape. There are sixteen commands you can use within the program and these are as follows:

EXDS: These are the arrow keys which move the character position on the 'macro' shape.

Key 1: When pressed it enables you to save the picture onto tape.

Key 2: When pressed it allows you to load a picture from tape.

Key 3: This enters you into 'character define mode'. The CH sign will appear in the white block. It can be moved around using the arrow keys (FCN 'S', 'D'). If 1 is pressed an orange dot will appear in the current cursor position. If 0 is pressed a blank will be displayed, effectively erasing what was there. When you finish, the number of characters left is displayed. If you run out of characters then you can either exit the program or save your picture onto tape.

Key 4: This displays the last character which was accessed or selected at the position on the screen where the arrows cross.

Key 5: Resets all variables and restarts the program.

Key 6: This terminates the program.

Key 7: If this key is pressed then it will erase the character at the place where the arrows cross. It remains in operation until another mode is selected.

Key 8: Change colour. You have a choice of every colour except clear and black. Press any key to change the colour and ENTER to return to the normal mode.

Key 9: This collects a character from where the arrows cross and that character can now be redefined if key 3 is pressed. This function is used to correct errors on the 'macro'.

Key A: This collects a character from where the arrows cross, enabling it to be displayed elsewhere.

Key B: This cancels mode A. If you try to redefine a character in mode A nothing will happen.

Key C: This will fill the whole box. It can have bits removed to make patterns.

Hints And Tips

1) To get the whole box as one character if you want to experiment with patterns do the following. When you have just RUN the program, or after pressing key 5, press key C. Then press key 9 and key 3. Now redefine the character and the whole box will change.

2) A picture can shimmer or look better if it is in a different colour. Experiment with key 8.

Key Reference Chart

MODE	KEY	FURTHER KEYS
Up	E	—
Down	X	—
Right	D	—
Left	S	—
Save	CTL 1	ENTER
Load	CTL 2	ENTER
Define Character	CTL 3	—
Display Character	CTL 4	—
Redo from start	CTL 5	—
Quit	CTL 6	—
Erase	CTL 7	—
Change Colour	CTL 8	all keys. ENTER for normal mode
Edit Character	CTL 9	—
Move Character	CTL A	—
Random Screen	CTL B	—

CTL = Control Key

3) If you don't want to experiment and you want highly detailed pictures use the following method.

Obtain a picture of the object you want to copy to the screen. Get some graph paper (squares of one or two millimetres are the best). Trace or copy your picture onto the paper. Colour every square which the line crosses. In a different colour divide the picture into blocks or eight squares (8 x 8). Copy the picture onto the screen using keys 3 and 4. Before using the program make sure you use 96 blocks or less otherwise you will run into problems.

HOW IT RUNS

100-300	Reserves memory for pictures, defines arrows and colours.
310-440	Sets screen up.
450-590	Takes input from user.
600-850	Moves arrows. Line 590 uses control characters which cannot be displayed by the printer so it should be ON POS ("123456789EXDS",CHR$(K),1)... When inputting these hold down the CTRL keys.
860-1040	Opens cassette file and saves picture to tape.
1050-1240	Retrieves picture from tape and displays it.
1250-1710	Defines character in box on left.
1720-1730	Displays character in box on right.
1740	End.
1750-1770	Sets pen to erase mode.
1780-1810	Options for all characters used up.
1820-1850	Print at subroutine.
1860-1960	Changes picture colour.
1970-1990	Swops characters from different positions.
2000-2030	Corrects bad value for character code.
2040-2050	Swops back the characters previously moved.
2090-2140	Sets pattern box.
2150-2200	Releases clear mode.
2210-2360	Displays random colours and characters when lack of inspiration strikes.

HINTS ON CONVERSION

This program contains a lot of commands which are unique to the Texas and because of this conversion will be very difficult. It would be better to read the How It Runs section and the instructions and then try to write the program from scratch on your own micro.

PROGRAM LISTING

```
100 RANDOMIZE
110 ZD=0
120 J=0
130 CH=95
140 CD=64
150 DIM M$(159),Y(24,32),H(8,8)
160 M$(32)="00"
170 CALL CHAR(32,"00")
180 CALL CHAR(40,"")
190 CALL CHAR(41,"FFFFFFFFFFFFFF
FF")
200 CALL CHAR(59,"002442FF4224")
210 CALL CHAR(60,"1038541010543
1")
220 CALL CHAR(62,"FC00D49CD400FC
")
230 CALL CHAR(63,"FFFFFFFFFFFFFF
FF")
240 CALL CHAR(64,"FFFFFFFFFFFFFF
FF")
250 HEX$="0123456789ABCDEF"
260 FOR A=1 TO 16
270 CALL COLOR(A,16,1)
280 NEXT A
290 COL=16
300 CALL SCREEN(2)
310 CALL CLEAR
320 FOR A=6 TO 13
330 CALL HCHAR(A,6,63,8)
340 NEXT A
350 CALL HCHAR(18,8,59)
360 CALL HCHAR(20,8,60)
370 CALL HCHAR(22,8,62)
380 FOR A=18 TO 22 STEP 2
390 CALL HCHAR(A,10,58)
400 NEXT A
410 CALL HCHAR(4,15,63,16)
420 CALL HCHAR(19,15,63,16)
430 CALL VCHAR(4,15,63,16)
440 CALL VCHAR(4,31,63,16)
```

TI-99/4A

HI-RES EDITOR

PROGRAM LISTING

```
450 REM  ** HIGH RES. IN T.I. BA
SIC. BY P.STRASSEN **
460 EY=12
470 X=18
480 CALL COLOR(2,10,1)
490 IF YOP=13 THEN 1110
500 CALL SOUND(-800,-1,0)
510 CALL KEY(0,K,S)
520 CALL SOUND(-800,1000,0,3000,
3,5000,5)
530 IF S=0 THEN 510
540 CALL SOUND(-800,-7,0)
550 IF K=65 THEN 2040
560 IF K=66 THEN 2210
570 IF K=67 THEN 2090
580 IF K=68 THEN 2160
590 ON POS("■■■■■■■■■■■■■■■■",CHR$(
K),1)+1 GOTO 510,600,640,730,770
,860,1080,1250,1720,130,1740,175
0,1860,1970
600 IF EY=5 THEN 510
610 EY=EY-1
620 CALL HCHAR(EY+1,32,32)
630 GOTO 670
640 IF EY=18 THEN 510
650 EY=EY+1
660 CALL HCHAR(EY-1,32,32)
670 CALL HCHAR(EY,32,60)
680 DX=11
690 DY=20
700 T$=STR$(EY-4)&" "
710 GOSUB 1820
720 GOTO 500
730 IF X=16 THEN 510
740 X=X-1
750 CALL HCHAR(3,X+1,32)
760 GOTO 800
770 IF X=30 THEN 510
780 X=X+1
790 CALL HCHAR(3,X-1,32)
800 CALL HCHAR(3,X,59)
810 DX=11
820 DY=18
830 T$=STR$(X-15)&" "
840 GOSUB 1820
850 GOTO 500
860 FOR A=17 TO 30
870 FOR B=5 TO 18
880 CALL GCHAR(B,A,Y(B,A))
890 NEXT B
900 NEXT A
910 OPEN #7:"CS1",SEQUENTIAL,INT
ERNAL,OUTPUT,FIXED 192
920 FOR A=17 TO 30
930 FOR B=5 TO 18
940 IF Y(B,A)=32 THEN 980
950 JOP=18
960 PRINT #7:A,B,Y(B,A),M$(Y(B,A
)),JOP
970 IF JOP=19 THEN 1050
980 NEXT B
990 NEXT A
1000 JOP=19
1010 A=30
1020 B=18
1030 Y(B,A)=32
1040 GOTO 960
1050 PRINT #7:CH,CD
1060 CLOSE #7
1070 GOTO 130
1080 OPEN #7:"CS1",SEQUENTIAL,IN
TERNAL,INPUT ,FIXED 192
1090 YOP=13
1100 GOTO 110
1110 FOR A=17 TO 30
1120 FOR B=5 TO 18
1130 INPUT #7:C,D,GET,AD$,JOP
1140 IF JOP=19 THEN 1190
1150 CALL CHAR(GET,AD$)
1160 CALL HCHAR(D,C,GET)
1170 NEXT B
1180 NEXT A
1190 INPUT #7:CH,CD
1200 FOR A=110 TO 9000 STEP 50
1210 CALL SOUND(-800,A,0,1000,10
,3000,15)
1220 NEXT A
1230 CLOSE #7
1240 GOTO 150
1250 IF CD=PUQ THEN 500
1260 FOR R=1 TO 8
1270 FOR C=1 TO 8
1280 CALL HCHAR(5+R,5+C,62)
1290 CALL KEY(0,K,S)
1300 IF S=0 THEN 1290
1310 IF (K=8)+(K=9)THEN 1560
1320 IF (K<48)+(K>49)THEN 1290
1330 H(R,C)=K-48
1340 CALL HCHAR(5+R,5+C,40+(K-48
))
1350 NEXT C
1360 NEXT R
1370 V$=""
1380 FOR R=1 TO 8
```

PROGRAM LISTING

```
1390 V$=V$&SEG$(HEX$,(H(R,1)*8+H
(R,2)*4+H(R,3)*2+H(R,4)+1),1)&SE
G$(HEX$,(H(R,5)*8+H(R,6)*4+H(R,7
)*2+H(R,8)+1),1)
1400 NEXT R
1410 IF QUP=15 THEN 2000
1420 IF CD<>32 THEN 1440
1430 CD=ZD
1440 CD=CD+1
1450 CALL CHAR(CD,V$)
1460 M$(CD)=V$
1470 CH=CH-1
1480 T$=STR$(CH)&" "
1490 DX=11
1500 DY=22
1510 GOSUB 1820
1520 FOR A=6 TO 13
1530 CALL HCHAR(A,6,63,8)
1540 NEXT A
1550 IF CH=0 THEN 1780 ELSE 500
1560 CALL HCHAR(5+R,5+C,40+H(R,C
))
1570 IF K=9 THEN 1650
1580 C=C-1
1590 IF C<>0 THEN 1280
1600 C=8
1610 R=R-1
1620 IF R<>0 THEN 1280
1630 R=8
1640 GOTO 1280
1650 C=C+1
1660 IF C<>9 THEN 1280
1670 C=1
1680 R=R+1
1690 IF R<>9 THEN 1280
1700 R=1
1710 GOTO 1280
1720 CALL HCHAR(EY,X,CD)
1730 GOTO 500
1740 END
1750 ZD=CD
1760 CD=32
1770 GOTO 500
1780 CALL SOUND(4250,110,0)
1790 CALL KEY(0,K,S)
1800 IF K=54 THEN 1740
1810 IF K=49 THEN 860 ELSE 1790
1820 FOR A=1 TO LEN(T$)
1830 CALL HCHAR(DY,DX+A,ASC(SEG$
(T$,A,1)))
1840 NEXT A
1850 RETURN
1860 CALL KEY(0,K,S)
1870 IF S=0 THEN 1860
1880 IF K=13 THEN 500
1890 COL=COL+1
1900 IF COL=17 THEN 1950
1910 FOR A=5 TO 16
1920 CALL COLOR(A,COL,1)
1930 NEXT A
1940 GOTO 1860
1950 COL=3
1960 GOTO 1910
1970 CALL GCHAR(EY,X,GET)
1980 QUP=15
1990 GOTO 1250
2000 CALL CHAR(GET,V$)
2010 M$(GET)=V$
2020 QUP=0
2030 GOTO 1520
2040 CALL GCHAR(EY,X,GET)
2050 TOP=137
2060 FY=EY
2070 FX=X
2080 GOTO 510
2090 FOR A=5 TO 18
2100 CALL HCHAR(A,16,64,16)
2110 NEXT A
2120 CD=64
2130 CH=95
2140 GOTO 1480
2150 IF JOP=19 THEN 1160 ELSE 11
10
2160 IF TOP<>137 THEN 510
2170 CALL HCHAR(EY,X,GET)
2180 CALL HCHAR(FY,FX,32)
2190 TOP=0
2200 GOTO 510
2210 CALL CLEAR
2220 FOR A=1 TO 300
2230 NEXT A
2240 FOR A=1 TO 9000
2250 CALL KEY(0,K,S)
2260 IF S<>0 THEN 2360
2270 V$=""
2280 FOR B=1 TO 8
2290 N$=STR$(INT(RND*9)+1)
2300 V$=V$&N$&N$
2310 NEXT B
2320 CALL CHAR(32,V$)
2330 CALL SCREEN(2)
2340 CALL COLOR(1,16,1)
2350 NEXT A
2360 GOTO 110
```

'NOW WIN THE POOLS'

THIS IS MEANT FOR **YOU** — ESPECIALLY IF YOU USE A SINCLAIR ZX81 or SINCLAIR SPECTRUM COMPUTER, or even ANY COMPUTER.

HAVE YOU EVER HAD THAT DREAM OR EVER WISHED THAT YOU HAD "WON ON THE POOLS" — AT LAST YOU CAN TURN IT INTO REALITY.

THERE **IS** A SECRET OF "HOW TO WIN ON THE FOOTBALL POOLS" — **IT CAN BE DONE.** I DISCOVERED THE SECRET A LONG TIME AGO — NOW, **FOR THE FIRST TIME** I'M PREPARED TO SHARE IT WITH YOU.

HOW DOES THIS INTEREST YOU — I HAVE DOCUMENTARY EVIDENCE BY WAY OF POOLS WINNINGS DIVIDEND SLIPS/ CANCELLED CHEQUES, etc, SHOWING MY PRESENT WINS ON THE POOLS AS FOLLOWS:—

First Dividends	Second Dividends	Third Dividends	Fourth Dividends	Fifth Dividends	Sixth Dividends
765	1,818	2,942	1,952	631	93

A GRAND TOTAL OF 8,201 (EIGHT THOUSAND, TWO HUNDRED AND ONE DIVIDENDS — so far).

I HOLD THE UNCHALLENGED WORLD'S RECORD FOR POOLS WINS

I AM MAKING THIS VERY SPECIAL, REDUCED PRICE OFFER TO READERS OF COMPUTING TODAY FOR A LIMITED PERIOD ONLY.

Do not let anyone tell you that it is impossible to "WIN ON THE POOLS" — since I perfected my method, **I HAVE WON REGULARLY** for over **TWENTY-FIVE YEARS** — proof that it is no 'flash-in-the-pan'.

I have CHALLENGED THE WORLD with my record of wins and with all the evidence that I possess — NO ONE has ever been able to accept the Challenge — I KNOW NO ONE EVER WILL.

MY SECRET IS NOW PLACED ONTO COMPUTER CASSETTE FOR YOU.

THE METHOD IS THE GREATEST TREBLE CHANCE WINNER IN THE HISTORY OF FOOTBALL POOLS — IT WILL LAST FOREVER — BOTH FOR ENGLISH AND AUSTRALIAN FOOTBALL POOLS, WITH EQUAL SUCCESS.

I now intend to give a limited number of people the opportunity of making use of my method — perfected over 25 years and proving itself on **EVERY ONE OF THOSE TWENTY-FIVE YEARS.**

You will have noted details of my personal achievements so far, as given to you above.

A GRAND TOTAL of 8,201, yes 8,201 POOLS DIVIDENDS, including **765 FIRST DIVIDENDS.**

My Pools Winnings Dividend slips now number so many, that they fill a very large suitcase and will stand as my evidence of all claims in **ANY COURT OF LAW IN THE WHOLE WORLD.**

Taking just the past 25 years into consideration, I have won ON AVERAGE over 328, (THREE HUNDRED AND TWENTY—EIGHT) Pools Dividends **EVERY YEAR** — or — AN AVERAGE of over **SIX DIVIDENDS EVERY WEEK** for **TWENTY—FIVE YEARS.**

You have my absolute Guarantee of the complete authenticity of every claim, cheque, document, letter, etc, contained herein.

I do have losing weeks, but ON AVERAGE my winnings show over SIX DIVIDENDS **EVERY WEEK** for the past 25 years.

I know that you are now utterly flabbergasted, it always happens to everyone with whom I come into contact. Please just sit back and **imagine** for a moment my **FIRST DIVIDEND** wins alone — they now number 765 (seven hundred and sixty-five) and will probably be even more by the time this advertisement appears in print.

I AM NUMBER ONE IN THE WORLD AND NO ONE DISPUTES IT.

For as long as I continue to enter the Football Pools my wins will continue. I have already said, they apply, with equal success to both English and Australian Football Seasons.

I intend to release a STRICTLY LIMITED NUMBER of copies of my cassette, (either for Sinclair ZX81 or Sinclair Spectrum) — DO NOT DELAY AND FIND YOU ARE TOO LATE, in which case I would have to refund your money.

I am so confident of **YOUR** success that if do **not** win at least THREE FIRST TREBLE CHANCE DIVIDENDS in the first 20 weeks of entering, I will completely cancel the balance of the purchase price and you do not have to pay me another penny, at any time, no matter how vast your winnings.

I only wish that space would allow me to give you photographs of my winnings slips, cancelled cheques, etc, but it is of course impossible — they now number 8,201 dividends. I have however given JUST A FEW EXTRACTS from ORIGINAL LETTERS I hold from my small Clientele.

I am the Inventor and Sole Proprietor of my method, Registered as EUREKA — ('I have found it'). I am known as The Professor in Pools Circles — I am of the Highest Rank in Forecasting — this is beyond dispute. I am marketing a limited number of Computer Cassettes, under my Registered Company — FOOTBALL ENTERPRISES.

My initial charge for a copy was £75, but for this SPECIAL REDUCED PRICE OFFER I will send you a copy, (for ZX81 or Spectrum) for £20, (twenty pounds) ONLY, plus your Promise to pay me the balance of £55 — **ONLY** IF YOU WIN AT LEAST THREE FIRST TREBLE CHANCE DIVIDENDS IN YOUR FIRST 20 WEEKS OF ENTERING — otherwise you owe me NOTHING FURTHER.

This is surely proof absolute of my supreme and utter confidence in my own abilities and in the capabilities of my discovery. I could easily CHARGE £2,000 per cassette on the evidence I possess, but that would not be fair to everyone, which is what I want to do.

My method is WORLD COPYWRIGHT, any infringement and immediate proceedings will be taken, without prior warning. It is truly ingenious and has stood the test of time.

My cassette is simplicity itself to operate and you'll be given FULL DETAILS for weekly calculating. Your entry need not involve you in any large weekly stakes, you can enter for as little as 25p, if you wish.

I charge NO COMMISSION on any of your wins — no matter how BIG they may be.

I realised a long time ago, that it was no good sitting down and **dreaming** about winning the pools, so I burnt the candle at both ends, working late into the night, occasionally RIGHT THROUGH THE NIGHT, I **KNEW** there was a way, eventually it all paid off and has been doing so ever since.

I am unable to vary my offer to anyone, so please do not request it, as I shall very easily dispose of the cassettes I have prepared and am making available.

IMMEDIATELY I perfected my method I commenced winning right away, (first with just a little £163, the first week I used it), I HAVE NEVER LOOKED BACK SINCE, amongst all those dividends was one for over **EIGHT THOUSAND POUNDS** for just **one eighth of a penny stake.**

I will release a copy on cassette, to you, on receipt of the completed order form and your Signature thereon, confirming you will treat it in the STRICTEST CONFIDENCE between us and retain it for your **OWN USE ONLY.**

PLEASE NOTE:
If you happen to be the proud owner of a Computer, **other than** a Sinclair ZX81 or Sinclair Spectrum, you can still purchase a copy of my method, for the same price and program it YOURSELF on to YOUR OWN COMPUTER.

Don't take my word for it, read what people write about me and my method:—

I won on Zetters last weekend. It was not a big sum, but all the same it was a very nice surprise for me. J.C., Lancs.

I appreciate the straightforward method you adopt, which is such a contrast to the rubbish of misrepresentation which is so common in the Betting World, by unscupulous and self-opinionated charlatans. C.H., Devon

Winnings cheque received today, sincere thanks. D.N., Devon

I congratulate you on your achievement. R.R., Wales

I should like to thank you for a most exciting season and look forward to hearing from you again. J.C., Hants.

I would like to acknowledge cheque and say how much I appreciate your integrity. J.M., Scotland

Many thanks for your system, it is all you say and more. J.C., Lancs.

Your wonderful system won me £3,527. I intend to visit London soon and will be able to come and see you personally. (Overseas Client). P.M., Kampala.

Many thanks for trying so hard to please us all, your brother should be thanked also. One of our daughters, WHOSE HUSBAND YOU HELPED ENORMOUSLY, has just phoned, the four of them have just spent a lovely holiday in Spain. K.R.,Isle of Man.

I sent in my FIRST entry last week and won 2nd and 3rd dividends, as you will see from the enclosed certificate. One more and I would have collected over £400 for FIRST dividend. Once I've won a fair amount I shall be staking from winnings and at 2p per line, A FIRST DIVIDEND last week at this would have been over £3,000. C.A., Yorks.

I am very interested indeed and enclose £20 herewith. I agree to pay you the balance of £55 **ONLY** if I win at least THREE FIRST TREBLE CHANCE DIVIDENDS in my first 20 weeks of entering — otherwise I owe you NOTHING FURTHER at any time — no matter how much money I win. My Signature below is my Undertaking to retain complete and absolute confidence about the method.

Name.....

Address.....

.....

.....

Signature ..... PCT 1

The Managing Director,
Football Enterprises,
'Anvon',
9 New Road,
Haverfordwest, Pembs.

Please tick if cassette is for:
Sinclair ZX81 (16K) ☐
Sinclair Spectrum (48K) ☐
Any other Computer ☐

sinclair special 3

Inside...
The New ZX Microdrive!
Latest software...
Latest prices...

The ZX Microdrive- and more!

For some time now, the new ZX Microdrive has been the subject of much discussion. Which is only to be expected, when the object of everyone's anticipation is *completely* new to the world of computing.

Microdrive provides high-speed access to truly massive storage. With just one Microdrive, you'll have at least 85K bytes of storage, and the ability to LOAD and SAVE in mere seconds. Yet the ZX Microdrive is about the size of a Spectrum mains adaptor, and costs less than £50!

First stocks are now in. Microdrives will be released on an order of priority basis. Spectrum owners who purchased by mail order, direct from us, will be sent full details including how to order, in a series of mailings that begins with the earliest names on our list.

And if you didn't buy by mail order?

Don't worry — for a colour brochure with full information on Microdrives, including how to order, just send us your name and address (use the coupon at the back of this issue of Sinclair Special). But remember, the sooner you send us your name, the sooner you'll get on the list.

Of course, there's much more to Sinclair than Microdrives, as you'll see on these pages. The latest releases of Spectrum and ZX81 software have been amongst the most successful ever. Prices of most established Sinclair products are at their lowest ever. To buy what you want, just use the Order Form.

Until the next issue of Sinclair Special, and more good news ...

Nigel Searle

Nigel Searle, Managing Director, Sinclair Research Ltd.

PS: Come and see us — and all that's new at Sinclair — at the PCW Show, Barbican Centre, from Sept 28th to Oct. 2nd. We'll be pleased to see you!

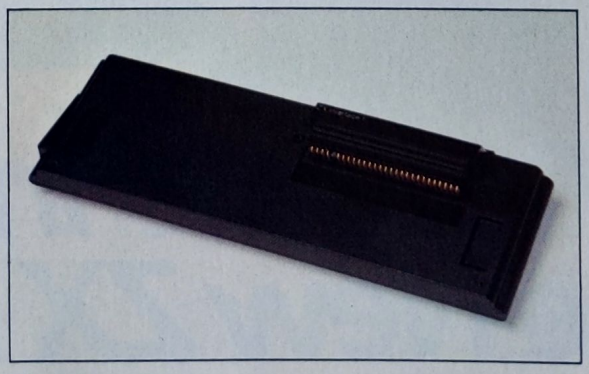
ZX Microdrive System preview!

ZX MICRODRIVE

At least 85K bytes storage, loads a typical 48K program in as little as 9 seconds: £49.95.

ZX MICRODRIVE CARTRIDGE

Compact, erasable, revolutionary. Complete with its own storage sleeve. Contains up to 50 files, with a typical access time of 3.5 seconds: £4.95.



ZX INTERFACE 1

Necessary for sending and receiving data from ZX Microdrive. Includes RS232 interface, enables creation of local area network of 2 to 64 Spectrums. Attaches to the underside of your Spectrum. Purchased with ZX Microdrive, just £29.95. As separate item, £49.95.

Six new ways to make more of your Spectrum

Take a look at these brand-new titles. Each is an outstanding new program using the full potential of the Spectrum, for games with stunningly animated graphics, for strategies of fiendish cunning, for masterly applications of computing capability...

Cyrus-IS-Chess Based on the Cyrus Program, which won the 2nd European Microcomputer Chess Championship *and* trounced the previously unbeaten Cray Blitz machine. With 8 playing levels, cursor piece-movement, replay and 'take-back' facilities, plus two-player option. The 48K version has many additional features including an extensive library of chess openings. For 16K or 48K RAM Spectrum.

Horace and the Spiders Make your way with Horace to the House of Spiders, armed only with a limited supply of anti-spider-bite serum. In the house, destroy the webs before the spiders can repair them. Then destroy the spiders, before *they* destroy Horace! Undoubtedly the creepiest Horace program ever produced! For 16K or 48K RAM Spectrum.

Computer Scrabble The famous board game, on-screen – with the whole board on view! A huge vocabulary of over 11,000 words. Full-size letter tiles, four skill levels – the highest of which is virtually unbeatable. For 1 to 4 players. For 48K RAM Spectrum.

(SCRABBLE trademark and copyright licensed by Scrabble Schutzrechte und Handels GmbH – a J.W. Spear and Sons PLC subsidiary.)

Backgammon A fast, exciting program, with traditional board display, rolling dice and doubling cube. Four skill levels. For experts – or beginners. (Rules are included – it's the quickest way to learn the game.) For 16K or 48K RAM Spectrum.

FORTH Learn a new programming language, as simple as BASIC, but with the speed of machine code. Complete with Editor and User manual. For 48K RAM Spectrum.

Small Business Accounts Speeds and simplifies accounting work, produces Balance Sheets, Profit and Loss information *and* VAT returns. Complete with User manual. For 48K RAM Spectrum.

Overleaf – your Sinclair order form.

Latest ZX81 software

These three new cassettes offer two totally different challenges to you and your ZX81. The games — like so many ZX81 games today — really do use the ZX81's capability. The FORTH program is a fascinating extension of your own computer understanding.

Sabotage. Defender or attacker? The choice is yours in this exciting game.

Be the guard and defend the ammunition in the compound — or be the Saboteur and attack it!

Written by Macronics for a ZX81 with 16K RAM. Cassette price: £4.95.

City Patrol. You are the Commander of a laser-firing ship. Your task is to intercept and destroy alien suicide ships descending on your city.

Written by Macronics for a ZX81 with 16K RAM. Cassette price: £4.95.

FORTH. Discover a new programming language which combines the simplicity of BASIC with the speed of machine code. FORTH's compiled code occupies less than a quarter of the equivalent BASIC program and runs ten times as fast. Free User-Manual and Editor Manual with each cassette.

Written by Artic for a ZX81 with 16K RAM. Cassette price: £14.95.

Prices round-up

ZX Spectrum 48K
now just **£129.95.**

ZX Spectrum 16K
now just **£99.95.**

ZX81 now just **£39.95.**

16K RAM Pack for ZX81
£29.95.

ZX Printer now just **£39.95.**

1.2A ZX Mains Adaptor
£7.95.

Printer Paper (5 rolls)
£11.95.

How to order

Simply fill in the relevant section(s) on the order-form below. Note that there is no postage or packing payable on Section B. Please allow 28 days for delivery. Orders may be sent FREEPOST (no stamp required). Credit-card holders may order by phone, calling 01-200 0200, 24 hours a day. 14-day money-back option.

sinclair

Sinclair Research Ltd,
Stanhope Road, Camberley,
Surrey GU15 3 PS.
Telephone: (0276) 685311.

To: Sinclair Research Ltd, FREEPOST, Camberley, Surrey, GU15 3BR. **ORDER FORM**

Section A: hardware purchase

Qty	Item	Code	Item Price £	Total £
	ZX Spectrum – 48K	3000	129.95	
	ZX Spectrum – 16K	3002	99.95	
	ZX 81 (including 1.2A Mains Adaptor)	1003	39.95	
	16K RAM pack for ZX81	1010	29.95	
	ZX Printer	1014	39.95	
	1.2A Mains Adaptor, for use with ZX81 computer/ZX Printer combination (only required if you have an early ZX81 with 0.7A Adaptor)	1002	7.95	
	Printer paper (pack of 5 rolls)	1008	11.95	
	Postage and packing: orders under £90	0028	2.95	
	orders over £90	0029	4.95	
			TOTAL £	

Section B: software purchase

Qty	Cassette	Code	Item Price £	Total £
	FOR SPECTRUM			
	G22/S:Backgammon	4021	5.95	
	G23/S:Cyrus-IS-Chess	4023	9.95	
	G24/S:Horace & the Spiders	4022	5.95	
	G25/S:Scrabble	4024	15.95	
	L1 /S:FORTH	4400	14.95	
	B6 /S:Small Business Accounts	4605	12.95	
	FOR ZX81			
	G25: Sabotage	2124	4.95	
	G24: City Patrol	2123	4.95	
	L1: FORTH	2400	14.95	
			TOTAL £	

*Delete/complete as applicable.

*Please charge to my Access/Barclaycard/Trustcard account no:

*I enclose a cheque/postal order made payable to Sinclair Research Ltd for £

Signature

Mr/Mrs/Miss

Address

PCT 909

(Please print)

ZX Microdrive information request

Please send me a colour brochure with full specifications of ZX Microdrive/Interface 1, *and* add my name to the Microdrive Mailing List! *(tick here)* ☐ (Remember to include your name and address on the form above).

SOFTWARE LISTING

Looking for a program to buy? Look no further! If it's available, it's listed here in our exclusive and comprehensive software checklists.

Looking through any computer magazine can be a bewildering experience if you're in search of a program. Count the hundreds of ads and thousands of titles on sale and it would be easy to lose heart!

We've tried to sort out the confusion, and the sheer numbers, to present an easily understood list for each machine. Where possible, we have eliminated duplications, so that the same tape with a different label is not listed twice. Rather it should be credited once, with as many suppliers as we could find.

Table Codes

In order to fit as many programs as possible into our pages, we have had to use codes for some columns, considerably shortening the wording.

The information given for each program is: Title, memory required to run it, company producing it, whether tape/cartridge or disk, type and supplier and price.

The codes we have used are:

Program Type

GM = Game
BS = Business routine
UT = Utility (ie. programming aid)
DO = Domestic
ED = Educational

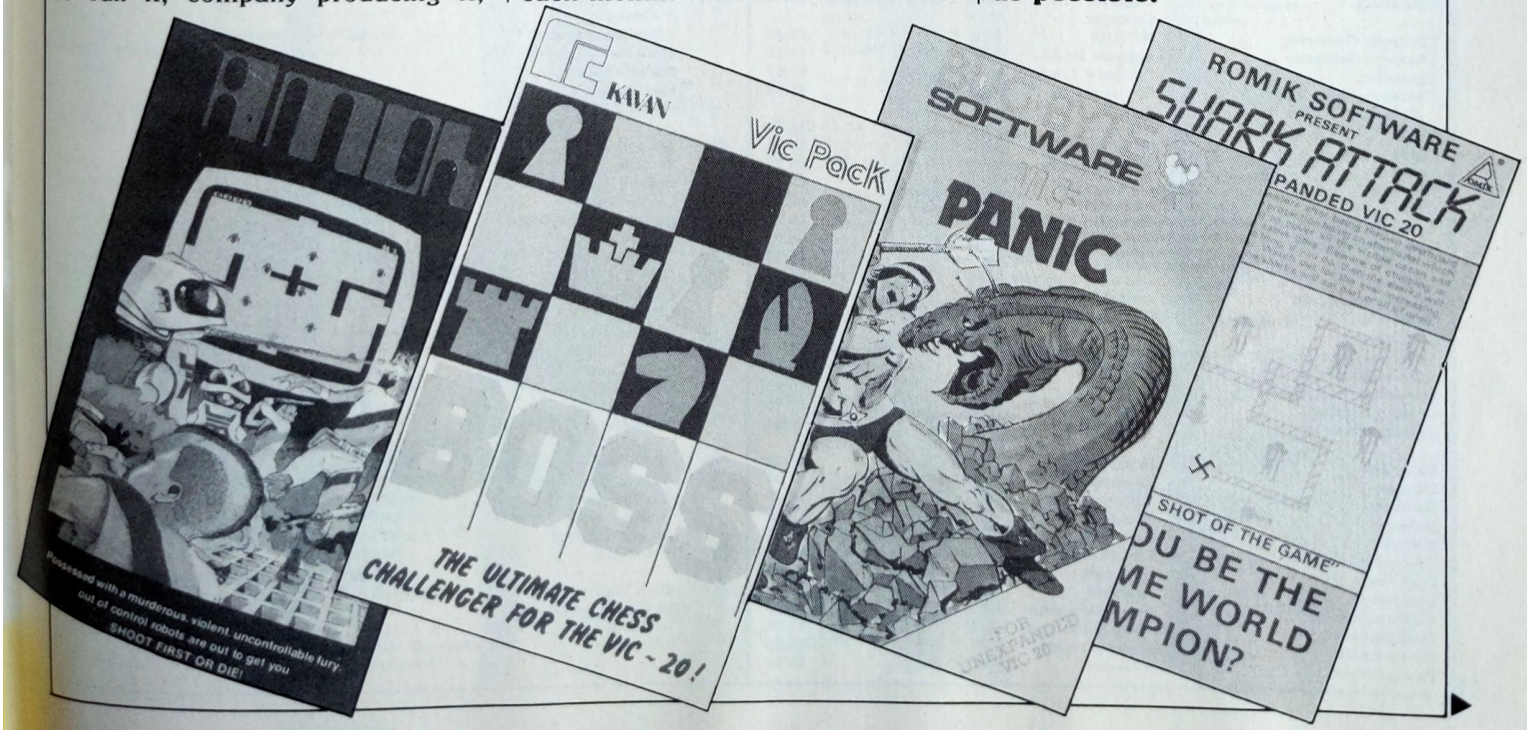
How Sold

R = Cartridge (may include memory)
C = Tape (cassette)
D = Disc (for expanded systems)
L = Listing (sold as print-out)

Due to overwhelming response we have been forced to alternate machines included in our checklist each month. Out this month are the TRS-80, Spectrum, Atari, ZX81. But don't panic they will be featured in October for you to make your software selection. You'll notice that this month we have unavoidably been forced to omit some of the dealer names and addresses. Our apologies.

Not Here?

To companies whose products are not listed herein we can only say TELL US ABOUT IT! This applies particularly to the smaller retailer who may sell only half a dozen or so programs for one machine. If you produce software for *any* of the machines on the market today, then we would love to include your wares in our checklists. Send it in to us, marked for the attention of the Editor (in our format *Please*!) or ring Chris Palmer on 01-437 1002 as soon as possible.



REFERENCE

SOFTWARE LISTING

BBC

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Action of the Heart	Ed	Garland Comp.	32K	C	JX	£11.76
Adventure	Gm	Micro Power	32K	C	GK	£6.95
Adventure	GM	Program Direct	32K	C	NP	£5.99
Adventure Quest	Gm	Level 9 Computing	32K	C	CU	£9.90
Algebraic Manipulation	Ut	Acornsoft	16K	C	AL,GA	£9.95
Algebraic Manipulation	Ut	Acornsoft	32K	C	AL,GA	£9.95
Alien	Gm	FBC Systems	16K	C	QL	£6.00
Alien Destroyers	Gm	Micro Power	32K	C	GK	£6.95
Alien Dropout	Gm	Superior Software	32K	C	KH	£6.50
Arcade Action	Gm	Acornsoft	16K	C	GA	£11.90
Arrow of Death (1)	Gm	Digital Fantasia	16K	C	IT	£6.95
Arrow of Death (2)	Gm	Digital Fantasia	16K	C	NT	£8.95
Airlift	Gm	Bug Byte	32K	C	KP	£5.50
Angle(4)	Ed	Chalksoft	32K	C	KT	£6.95
Append It	Ut	Aztec S/W	16K	C	IB	£3.00
Asteroids/Frong	Gm	Aardvark Software	16K	C	IU	£4.00
Asteroid Belt	Gm	Electronics Appplied	32K	C	IF	£11.50
Asteroid Belt	Gm	Computer Concepts	16K	C	GJ	£7.80
Astro Navigator	Gm	Micro Power	32K	C	GK, NR	£6.95
Atlantis	Gm	IJK Software	32K	C	IT	£6.95
Awari	Gm	Foilkade	16K	C	NR	£5.95
Backgammon	Ut	Bug Byte	32K	C	EA,KP	£8.00
Balloons	Gm	C J E Microcomputers	32K	C	NV	£6.00
Basic Maths	Ed	Aztec S/W	16K	C	IB	£3.00
Battlefield	Gm	Micro-Aid	32K	C	IZ	£2.50
Banner	Do	Micro-Aid	16K	C	IZ	£2.95
Beeb-Chase	Gm	Database Software	32K	C	NU	£7.50
Beebmunch	Gm	I.J.K. S/W	32K	C	IT	£5.95
Beebtrek	Gm	Software for All	16K	C	KN	£7.95
BEEP-BEEB	Gm	IJK	32K	C	IT	£3.95
Bounty Pirates	Gm	Aztec S/W	16K	C	IB	£5.50
Break-Up	Gm	Miking S/W	32K	C	KC	£3.95
Breakout	Gm	I.J.K. S/W	16K	C	IT	£3.95
Breakout	Gm	Bryants S/W	32K	C	HW	£3.75
Bridgeman	Gm	Bridge S/W	32K	C	KJ	£7.90
Call Your Bluff	Gm	Square Software	16K	C	NY	£6.00
Capitol Cities	Ed	Square Software	16K	C	NY	£6.00
Carbohydrate Metabolism	Ed	Garland Comp.	32K	C	JX	£18.24
Cashbook A	Do	Micro-Aid	16K	C	IZ	£3.95
Cashbook B	Do	Micro-aid	16K	C	IZ	£3.95
Caves of Anoron	Gm	FBC Systems	32K	C	QL	£7.00
Cat & Mouse	Gm	Micro Power	16K	C	GK	£4.95
Cells and Serpents/ Stockmarket	Gm	ASP Software	16K	C	OD	£11.45
Cells & Serpent	Gm	Hexagon S/W	16K	C	JA	£5.00
Centipede	Gm	Superior S/W	32K	C	KH	£7.00
CESCIL	Ed	Eduquest	16K	C	NW	£19.95
Character Builder	Ut	Davensoft	16K	C	NX	£4.95
Characters	Ut	Computer Concepts	32K	C	GJ	£6.67
Character Generator	Ut	MP S/W	32K	C	JZ	£3.00
Character Generator	Ut	Software for All	32K	C	KN	£4.95
Characters	Ut	Computer Concepts	16K	C	GJ	£6.67
Characters & Envelope Definer	Ut	Electronics Applied	32K	C	IF	£5.50
Chess	Gm	Bug Byte	32K	C	EA	£11.50
Chess	Gm	Micro Power	32K	C	GK	£6.95
Circus	Gm	Digital Fantasia	32K	C	NT	£8.95
Claws	Ed	Bryants S/W	16K	C	HW	£3.75
Cards	Gm	Micro-Aid	16K	C	IZ	£2.95
Cobra/Robo-Swamp	Gm	Software for All	16K	C	KN	£6.95
Cobra/Robo-Swamp	Gm	Software for All	32K	C	KN	£6.95
Code Race	Gm	Computer Concepts	16K	C	GJ	£6.67
Code Race	Ut	Computer Concepts	32K	C	GJ	£6.67
Colossal Adventure	Gm	Level 9 Computing	32K	C	CU	£9.90
Connect 4	Gm	Database Software	32K	C	NU	£5.90
Constellation	Ed	Micro Power	32K	C	GK	£5.95
Cookbook Wizardry	Do	Database Software	32K	C	NU	£7.50
Cowboy Shoot-out	Gm	Micro Power	32K	C	GK	£5.95
Creative Graphic Pack	Ut	Acornsoft	16K	C	AL,GA	£9.95
Creative Graphics	Ut	Acornsoft	32K	C	AL,GA	£9.95
Crossed Words	Ed	Aztec S/W	16K	C	IB	£6.50
Data-Quiz	Ut	Bryants S/W	32K	C	HW	£4.88
Database	Bs	Computercat	16K	C	IJ	£11.95
Database	Bs	Software for All	16K	C	KN	£9.95
Defchr	Ut	Micro-Aid	16K	C	IZ	£2.95
Defender	Gm	Acornsoft	32K	C	AL,GA	£9.95
Descender	Gm	FBC Systems	32K	C	QL	£7.50
Desk Diary	Bs	Acornsoft	32K	C	AL,GA	£9.95
Desk Diary	Bs	Acornsoft	16K	C	AL	£9.95
Devil's Causeway	Gm	Anirog Computers	16K	C	0A	£6.00
Dissassembler	Ut	Micro Power	16K	C	GK	£5.95
Dissassembler	Ut	Program Direct	16K	C	NP	£3.00
Dissassembler	Ut	Davansoft	16K	C	NX	£5.95

SOFTWARE DEALERS

Supplier Code

AA Micro Centre Ltd
30 Dundas Street
Edinburgh EH3 6JN
031 556 7354

AB Micro and Video Palace
62-64 Kensington High Street
London W8
01 937 8587

AC Laskys
7-9 Queensway
London W23RX
01 200 0444

AD Datarite Terminals Ltd
Caldare House
144-146 High Street
Chadwell Heath
Essex RM6 6NT
01 590 1155

AE Vincelord Ltd
Suite 2
26 Charing Cross Road
London WC2
240 0213/0217

AF Micro Computer Land
Shropshire House
2-10 Capper Street
London WC1E 6JR
01 637 4078/948 6411

AG Comart Ltd
St Neots
Cambs PE19 3JG
(0480) 215005

AH Cream Computer Shop
Rabbit Software
380 Station Road
Harrow
Middlesex
863 0833

AI Microvalue
Computer Interfacing &
Equipment Ltd
The Micro Spares Shop
19 Roseburn Terrace
Edinburgh EH12 5NG
(031) 337 5611

AJ Molimerx Ltd
A J Harding
1 Buckhurst Road
Town Hall Square
Bexhill-On-Sea
East Sussex
(0424) 220391/223636

AK GW Computers Ltd
55 Bedford Court Mansions
Bedford Avenue
London WC1
01 636 8210/631 4818

AL Acornsoft Ltd
4a Market Hill
Cambridge
CB23NJ
0223 316039

AM Acorn Computers
Fulbourne Road
Cherry Hinton
Cambridge

AN Microcomputer Products Int.
8 Cambridge House
Cambridge Road
Barking
Essex 1G11 8NT
591 6511

AO Xitan Systems
23 Cumberland Place
Southampton S01
0703 38740

AP KGB Micros Ltd
14 Winsor Road
Slough
Berks
Slough (0753) 38581/38319

AQ Broadside
2 The Spinney
North Cray
Kent

AR Software Ltd
387 8832/388 9927

AS Lucas Logic Ltd
Nascom Microcomputers
Division
Welton Road
Wedgnock Industrial Estate
Warwick CV34 5PZ

AT Atlantic Micro System
70-72 Honor Oak Park
London SE23 1DY
01 699 2202

AU TCL Software
59/61 Theobalds Road
London WC1
405 5240/2113

AV IAS
Cambridge Road
Orwell
Royston
Herts
0223 207689

AW Intelligent Artefacts Ltd
Cambridge Road
Orwell
Royston
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Mailing B	Bs	Micro-Aid	16K	C	IZ	£3.95
Martians	Gm	Micro Power	32K	C	GK	£5.95
Mastermind	Gm	Micro Power	16K	C	GK	£3.95
Maze Invaders	Gm	Micro Power	32K	C	GK	£4.95
Maze Man	Gm	C J E Microcomputers	32K	C	NV	£6.00
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Micro Man	Gm	Pro S/W	32K	C	LD	£8.00
Middle Kingdom	Gm	Pro S/W	16K	C	LD	£8.00
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TRS-80 UTILITIES 2

User friendly error handling by Iain Crawford

The version of microsoft basic used on the TRS-80 and video-genie range of microcomputers is one of the better implementations of basic on this type of machine. For instance, how many other personal computers have a print using command?. Unfortunately when you make a mistake Level II basic is not very helpful.

The two letter error messages that are normal to Level II are cryptic to say the least. Do you know what FD or UE means without looking it up?

Now assuming that your latest Three Mile Island or space shuttle simulation has just bombed out and you're faced with one of those cryptic little error messages, what do you do? If you're like me you will list the line named. At this point you will probably find that the offending line is a multi-statement line with about ten statements that could have caused the crash. If the bug is stubborn you might have to retype the line in bits to find which part of the statement is at fault.

This article describes a utility which will make these two irritations a thing of the past. With this program resident any error which occurs will generate a proper error message and the line where the error was detected is listed up to where execution stopped.

Program Description

This program makes extensive use of the BASIC ROM subroutines and BASIC pointers in the area of RAM used for 'housekeeping' by BASIC.

The first part of the program labels these subroutines for use by the assembler. The remarks describe the purpose of the routines and pointers.

The label 'top' might seem a bit strange as the first use of it is to set the machine code assembly address. Its other use is at the end where it is used to initialise the top of BASIC to below that of the program on loading it. This clears the string area and leaves any BASIC program and numeric variable intact. This is so the program can be loaded in as an afterthought. Another point to mention is the use of multiple ORG statements to initialise the program rather than using a separate initialisation program.

The program proper begins at line 00160. After saving the error code for use by the error printing routine the point where execution stopped is set to zero and the original value saved on the stack. This fools the line expansion routine that this point is the end of the line. The line number is retrieved and a call is made to the line finding routine. If no line with the number given is found then the routine is left without attempting to print the line and the error is assumed to be an immediate mode command error. The line number is not printed but if required it can be done by loading register pair HL with the line number and calling the ROM subroutine at 0FAF HEX. After the line is printed, the BASIC program is put back to normal.

The next part of the routine begins at line 00480 and is used to print the user supplied error messages. Please note the purpose of this routine is to make your computer more user-friendly, not user-abusive!!!

The error code supplied by the ROM is used to get the address of the message. The message is then printed out until a carriage return is found. Anyone who has used EDTASM will notice that the message table is not printed by EDTASM. This has been done like this to save space.

Lines 00610 and 00620 cause the ROM program to resume execution after the normal error output routine.

As it stands the program uses a relatively large amount of space for its error message. One way round this might be to use a bit packer, i.e. compress the code into seven bits. I didn't think that for this job it was worth the effort. However for all you memory misers out there the program can be made a smaller by ditching the messages and leaving just the line display.

Delete lines	00490-01330
Then add a line	00165 PUSH HL
Then add a line	00490 POP HL
And a line	00500 RET

This modification to the routine leaves the normal error messages alone.

If you would like your machine to automatically enter the edit mode for any error then load RAM address with 409A HEX with two.

i.e. insert line	00175 LD A,2
and line	00180 LD (409AH),A

This fools the system that its dealing with a syntax error.

With this utility programming should be easier. It doesn't check syntax on entry like newer languages but it helps.

PROGRAM LISTING

```
                00010 ; IMPROVED ERROR HANDLING FOR LEVEL II
                00020 ; I.A.M. CRAWFORD
                00030 ; 12/4/83
7C93            00040 TOP       EQU     7C93H   ; TOP OF BASIC RAM
40EC            00050 LINNUM    EQU     40ECH   ;LAST LINE EXECUTED
40EE            00060 ERRADR    EQU     40EEH   ;LAST BASIC BYTE EXEC'D
1B2C            00070 GETLIN    EQU     1B2CH   ; GET LINE NO. ADDRESS
2B7E            00080 EXPLIN    EQU     2B7EH   ; EXPAND BASIC LINE
                00090                           ; INTO KEYBOARD BUFFER
40A7            00100 EXPADR    EQU     40A7H   ; ADDRESS EXPANDED LINE
032A            00110 WRCHAR    EQU     032AH   ; WRITE CHAR IN A TO
                00120                           ; MOST RECENT OUTPUT
2B75            00130 WRLINE    EQU     2B75H   ; WRITE EXPANDED LINE TO O.D.
```

```
20FE                    00140 WRCRET    EQU     20FEH       ; PRINT CARR. RETURN
7C94                    00150           ORG     TOP + 1     ; HERE 'COS OF OTHER ROUTINES
7C94 D5                 00160 ERROR     PUSH    DE          ; E CONTAINS ERROR NUMBER
7C95 2AEE40             00170           LD      HL,(ERRADR) ; HL = POINT WHERE ERROR
                        00180                               ; OCCURED IN PROGRAM
7C98 23                 00190           INC     HL          ; POINT TO NEXT BYTE
7C99 56                 00200           LD      D,(HL)      ; SAVE BYTE AFTER ERROR
7C9A D5                 00210           PUSH    DE
7C9B 77                 00220           LD      (HL), A     ;A ALREADY CONTAINS ZERO
7C9C E5                 00230           PUSH    HL
7C9D ED5BEC40           00240           LD      DE,(LINNUM)
7CA1 CD2C1B             00250           CALL    GETLIN      ; GET ADRESS OF LINE IN BC
7CA4 301C               00260           JR      NC,NOLINE   ; IMMEDIATE COMMAND
7CA6 60                 00270           LD      H,B         ; GET ADDRESS OF LINE IN HL
7CA7 69                 00280           LD      L,C
7CA8 23                 00290           INC     HL          ; JUMP PAST POINTER TO
7CA9 23                 00300           INC     HL          ; NEXT LINE
7CAA 42                 00310           LD      B,D
7CAB 4B                 00320           LD      C,E         ; GET LINE NUMBER IN BC
7CAC 23                 00330           INC     HL
7CAD 23                 00340           INC     HL          ; POINT TO BASIC LINE
7CAE CD7E2B             00350           CALL    EXPLIN      ; EXPAND LINE INTO BUFFER
7CB1 2AA740             00360           LD      HL,(EXPADR)
7CB4 CD752B             00370           CALL    WRLINE      ; PRINT EXPANDED LINE
7CB7 3EA2               00380           LD      A,162       ; FOLLOWED BY A
7CB9 CD2A03             00390           CALL    WRCHAR      ; GRAPHICS CHARACTER
7CBC CDFE20             00400           CALL    WRCRET      ; CARRIAGE RETURN
7CBF CDFE20             00410           CALL    WRCRET      ; AND AGAIN
7CC2 E1                 00420 NOLINE    POP     HL          ; ADDRESS OF ERROR
7CC3 D1                 00430           POP     DE          ; D = SAVED CHARACTER
7CC4 72                 00440           LD      (HL),D      ; PUT BASIC LINE BACK
                        00450                               ; TO NORMAL
                        00460 ;* * * * *  ERROR MESSAGES *
                        00470
7CC5 D1                 00480           POP     DE          ; E CONTAINS ERROR NUM
7CC6 21DB7C             00490           LD      HL, TABLE   ; TABLE OF MESSAGE ADDRESS'S
7CC9 19                 00500           ADD     HL,DE       ; HL NOW HAS MESSAGE ADDRESS
                        00510                               ; ADDRESS
7CCA 5E                 00520           LD      E,(HL)      ; GET MESSAGE ADDRESS INTO DE
7CCB 23                 00530           INC     HL
7CCC 56                 00540           LD      D,(HL)
7CCD EB                 00550           EX      DE,HL       ; HL = MESSAGE ADDRESS
7CCE 7E                 00560 OUT       LD      A,(HL)      ; GET CHAR TO OUTPUT
7CCF 23                 00570           INC     HL
7CD0 CD2A03             00580           CALL    WRCHAR      ; CHAR TO OUTPUT DEVICE
7CD3 FE0D               00590           CP      0DH
7CD5 20F7               00600           JR      NZ,OUT      ; OUTPUT TILL C.RET FOUND
7CD7 E1                 00610           POP     HL          ; REMOVE OLD RETURN ADDRESS
7CD8 C3FE19             00620           JP      19FEH       ; BACK TO BASIC ROM AFTER
                        00630                               ; NORMAL ERROR MESSAGE PRINT
7CDB 097D               00640 TABLE     DEFW    NF          ; ADDRES TABLE TO MESSAGES
7CDD 1A7D               00650           DEFW    SN
7CDF 257D               00660           DEFW    RG
7CE1 3A7D               00670           DEFW    OD
7CE3 467D               00680           DEFW    FC
7CE5 5C7D               00690           DEFW    OV
7CE7 6D7D               00700           DEFW    OM
7CE9 7B7D               00710           DEFW    UL
7CEB 8F7D               00720           DEFW    BS
7CED 9F7D               00730           DEFW    DD
7CEF B37D               00740           DEFW    D0
7CF1 C47D               00750           DEFW    ID
7CF3 D77D               00760           DEFW    TM
7CF5 EE7D               00770           DEFW    OS
7CF7 027E               00780           DEFW    LS
7CF9 1A7E               00790           DEFW    ST
7CFB 357E               00800           DEFW    CN
7CFD 437E               00810           DEFW    NR
7CFF 4E7E               00820           DEFW    RW
7D01 577E               00830           DEFW    UE
7D03 657E               00840           DEFW    MO
7D05 757E               00850           DEFW    FD
7D07 7E7E               00860           DEFW    L3
                        00870 NF        DEFM    'NEXT WITHOUT FOR'
7D19 0D 4E4558542057495448484F555420464F52
7D19 0D                 00880           DEFB    0DH
                        00890 SN        DEFM    'BAD SYNTAX'
7D1A 424144205359D4E544158
7D24 0D                 00900           DEFB    0DH
                        00910 RG        DEFM    'RETURN WITHOUT GOSUB'
7D25 52455455524E20574954484F555420474F535542
7D39 0D                 00920           DEFB    0DH
                        00930 OD        DEFM    'OUT OF DATA'
7D3A 4F5554204F462044415441
```

TRS-80 UTILITIES 2

```
7D45 0D                 00940                   DEFB    0DH
                        00950 FC                DEFM    'ILLEGAL FUNCTION CALL'
7D46 494C4C4547414C2046554E4354494F4E2043414C4C
7D5B 0D                 00960                   DEFB    0DH
                        00970 OV                DEFM    'NUMBER TOO LARGE'
7D5C 4E554D42455220544F4F204C41524745
7D6C 0D                 00980                   DEFB    0DH
                        00990 OM                DEFM    'OUT OF MEMORY'
7D6D 4F5554204F46204D454D4F5259
7D7A 0D                 01000                   DEFB    0DH
                        01010 UL                DEFM    'MISSING LINE NUMBER'
7D7B 4D495353494E47204C494E45204E554D424552
7D8E 0D                 01020                   DEFB    0DH
                        01030 BS                DEFM    'INDEX TOO LARGE'
7D8F 494E44455820544F4F204C41524745
7D9E 0D                 01040                   DEFB    0DH
                        01050 DD                DEFM    'REDIMENSIONED ARRAY'
7D9F 4544494D454E53494F4E4544204152524159
7DB2 0D                 01060                   DEFB    0DH
                        01070 D0                DEFM    'DIVISION BY ZERO'
7DB3 4449564953494F4E204259205A45524F
7DC3 0D                 01080                   DEFB    0DH
B                       01090 ID                DEFM    'NOT DIRECT COMMAND'
7DC4 4E4F54204449524543542043 4F4D4D414E44
7DD6 0D                 01100                   DEFB    0DH
                        01110 TM                DEFM    'VARIABLE TYPE MISMATCH'
7DD7 5641524941424C4520545 95045204D49534D41544348
7DED 0D                 01120                   DEFB    0DH
                        01130 OS                DEFM    'OUT OF STRING SPACE'
7DEE 4F5554204F4620535452494E47205350414345
7E01 0D                 01140                   DEFB    0DH
                        01150 LS                DEFM    'STRING > 255 CHARACTERS'
7E02 535452494E47203E2032353520434841524143544552 53
7E19 0D                 01160                   DEFB    0DH
                        01170 ST                DEFM    'STRING FORMULA TOO COMPLEX'
7E1A 535452494E4720464F524D554C4120544F4F20434F4D504C4558
7E34 0D                 01180                   DEFB    0DH
                        01190 CN                DEFM    'CAN'T CONTINUE'
7E35 43414E5420434F4E54494E5545
7E42 0D                 01200                   DEFB    0DH
                        01210 NR                DEFM    'NO RESUME'
7E43 4E4F2020524553554D45
7E4D 0D                 01220                   DEFB    0DH
                        01230 RW                DEFM    'NO ERROR'
7E4E 4E4F204552524F52
7E560D                  01240                   DEFB    0DH
                        01250 UE                DEFM    'NO SUCH ERROR'
7E57 4E4F2053554348204552524F52
7E64 0D                 01260                   DEFB    0DH
                        01270 MO                DEFM    'MISSING OPERAND'
7E65 4D495353494E47204F504552414E44
7E74 0D                 01280                   DEFB    0DH
                        01290 FD                DEFM    'BAD DATA'
7E75 42414420444155441
7E7D 0D                 01300                   DEFB    0DH
                        01310 L3                DEFM    'DISC BASIC COMMAND'
7E7E 4449534320424153494320434F4D4D414E44
7E90 0D                 01320                   DEFB    0DH
41A6                    01330                   ORG     41A6H   ; RAM ADDRESS CALLED
41A6 C3                 01340                   DEFB    0C3H    ; BY ERROR ROUTINE
41A7 947C               01350                   DEFW    ERROR
                        01360 ; AUTO SET MEMORY SIZE FOLLOWS
40B1                    01370                   ORG     40B1H   ; HIMEM POINTER
40B1 937C               01380                   DEFW    TOP
40D6                    01390                   ORG     40D6H   ; TOP STRING AREA
40D6 937C               01400                   DEFW    TOP
40A0                    01410                   ORG     40A0H   ; BOTTOM STRING AREA
40A0 617C               01420                   DEFW    TOP-50  ; CLEAR 50
40E8                    01430                   ORG     40E8H   ; STACK POINTER
40E8 5F7C               01440                   DEFW    TOP-52
0072                    01450                   END     72H
00000 TOTAL ERRORS
```

L3	7E7E	D0	7DB3	TABLE	7CDB
FD	7E75	DD	7D9F	NOLINE	7CC2
MO	7E65	BS	7D8F	ERROR	7C94
UE	7E57	UL	7D7B	WRCRET	20FE
RW	7E4E	OM	7D6D	WRLINE	2B75
NR	7E43	OV	7D5C	WRCHAR	032A
CN	7E35	FC	7D46	EXPADR	40A7
ST	7E1A	OD	7D3A	EXPLIN	2B7E
LS	7E02	RG	7D25	GETLIN	1B2C
OS	7DEE	SN	7D1A	ERRADR	40EE
TM	7DD7	NF	7D09	LINNUM	40EC
1D	7DC4	OUT	7CCE	TOP	7C9E

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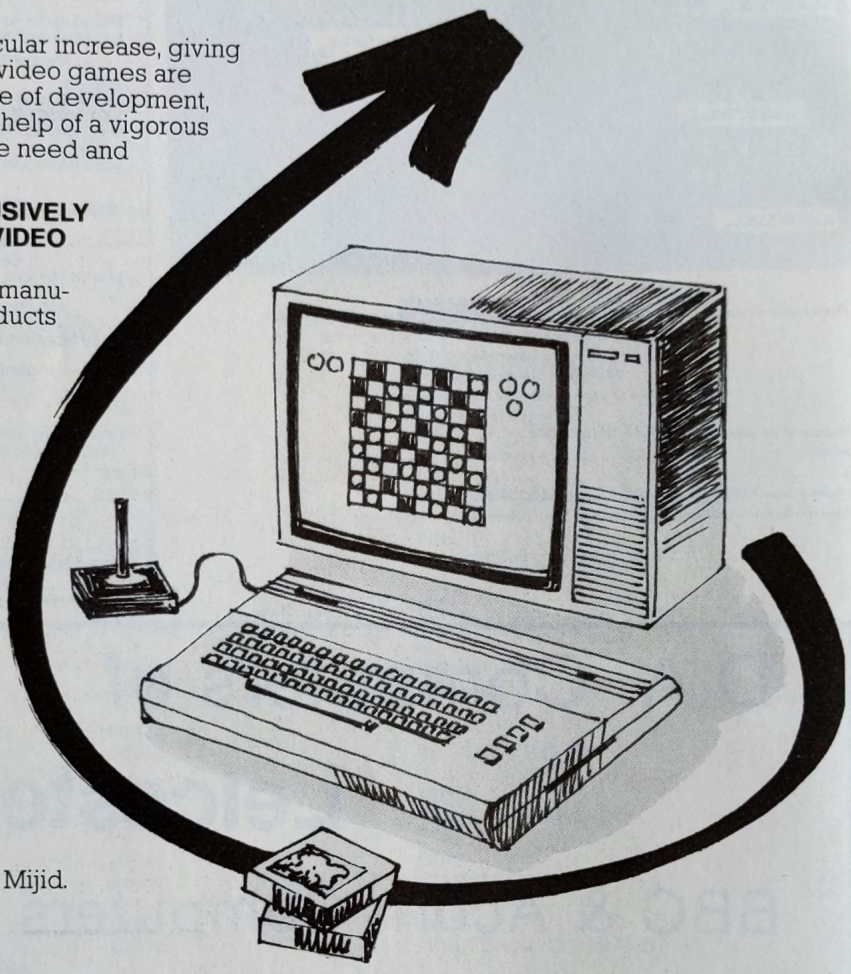

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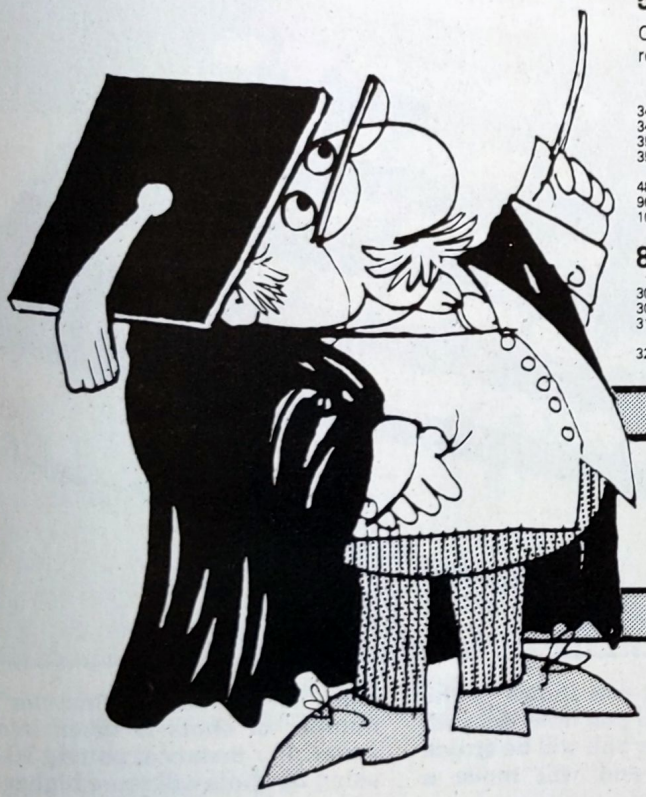

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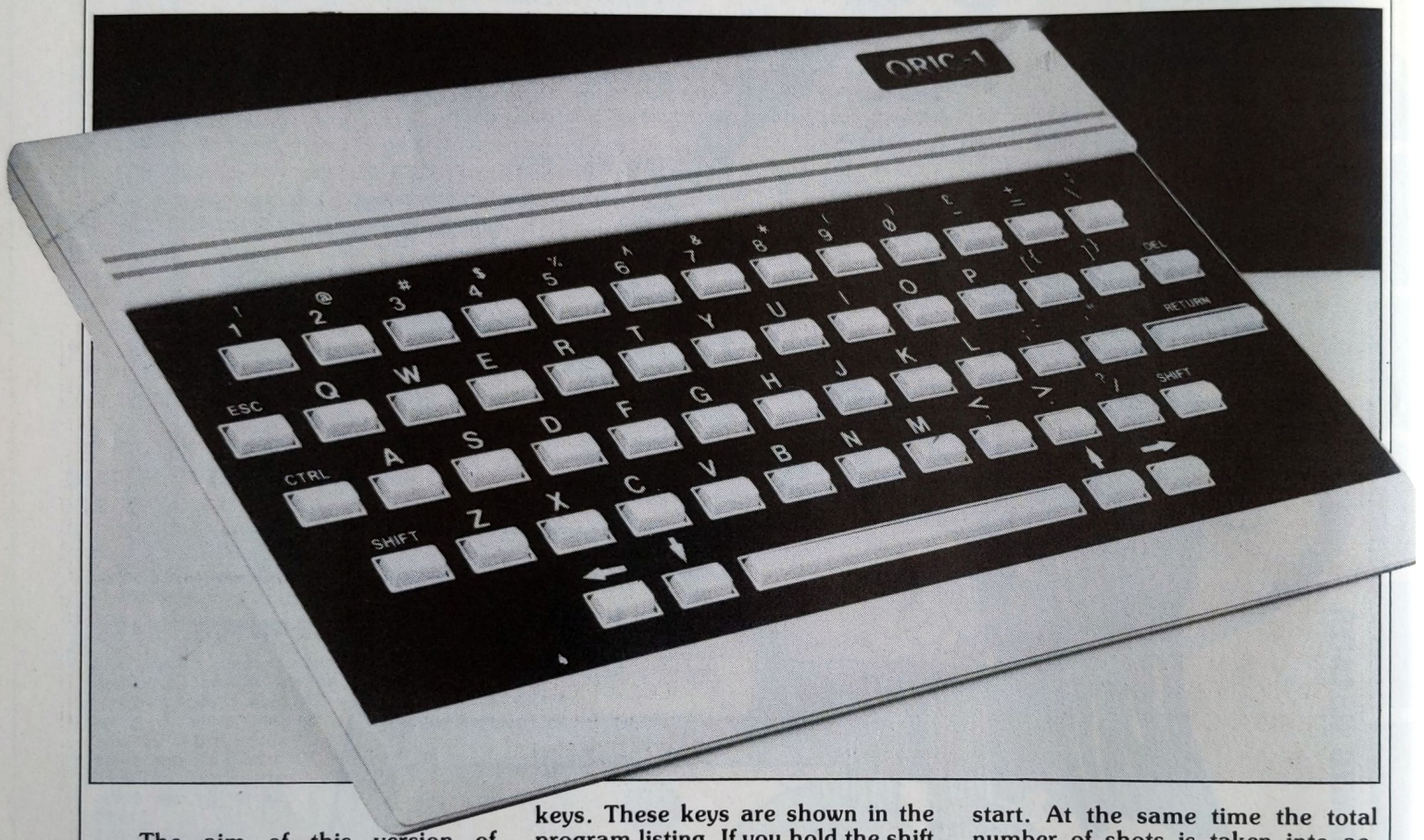
Last month we printed R.M. Dutton's conversion for the ORIC. Here is the second conversion he did. This time it is the game of Billiards.



The aim of this version of Billiards is to clear all the balls off the table using the cue ball. You lose no points for missing a ball, so you can move the cue ball around to line up your shots. You aim the cue ball by pressing one of the direction keys. These keys are shown in the program listing. If you hold the shift key down, the cue ball will be struck with less force and will move a shorter distance.

The score is calculated on the number of balls potted in relation to the number that are present at the start. At the same time the total number of shots is taken into account. For instance, potting 10 balls using 20 shots will score higher than potting 10 balls in 30 shots. The game is over when you have potted all the balls or have accidentally potted the cue ball itself.

PROGRAM LISTING

```
2 GOSUB3010:PAPER0:INK7
3 PING:S2=SQR(2):GOSUB2000:GOTO110
5 RN=INT(505*RND(1))+48241
6 IFPEEK(RN)<>32THEN5
7 RETURN
10 POKEPS,32
12 IFBAL=0THENPOKENP,96
14 IFBAL=1THENPOKENP,79
16 RETURN
20 PLAY1,0,T,375:RETURN
100 REMPOOL TABLE
110 CLS
120 FORI=48242TO48279
130 POKEI,148:POKEI+640,148:NEXT
```

```
140 FORI=48241TO48881STEP38
150 POKEI,148:POKEI+38,148:I=I+2:NEXT
160 POKE48241,126:POKE48279,126:POKE4826
0,126:POKE48261,126
170 POKE48881,126:POKE48919,126:POKE4890
0,126:POKE48901,126
180 GOSUB5
190 POKERN,96:PS=RN
200 FORI=1TONB:GOSUB5
210 POKERN,79:NEXT
300 GETT$:IFT$=""THEN300
310 IFT$="W"ORT$="w"THENAN=1:GOTO400
320 IFT$="E"ORT$="e"THENAN=2:GOTO400
330 IFT$="D"ORT$="d"THENAN=3:GOTO400
340 IFT$="C"ORT$="c"THENAN=4:GOTO400
350 IFT$="X"ORT$="x"THENAN=5:GOTO400
360 IFT$="Z"ORT$="z"THENAN=6:GOTO400
370 IFT$="A"ORT$="a"THENAN=7:GOTO400
380 IFT$="Q"ORT$="q"THENAN=8:GOTO400
390 T$="":GOTO300
400 IFASC(T$)<100THENNC=13:GOTO403
402 NC=43
403 TR=TR+1
404 IFAN=8ORAN=2ORAN=4ORAN=6THENNC=NC/S2
405 FORK=1TONC
410 ONANGOTO420,430,440,450,460,470,480,490
420 NP=PS-40:GOTO500
430 NP=PS-39:GOTO500
440 NP=PS+1:GOTO500
450 NP=PS+41:GOTO500
460 NP=PS+40:GOTO500
470 NP=PS+39:GOTO500
480 NP=PS-1:GOTO500
490 NP=PS-41:GOTO500
500 REM
510 TP=PEEK(NP)
520 IFTP<>32THEN550
530 GOSUB10:GOTO950
550 IFTP<>126THEN600
555 T=2:GOSUB20
560 POKEPS,32
565 IFBAL=0THENCX=110:GOTO1000
570 SC=SC+1:IFSC=NBTHENCX=42:GOTO1000
575 GOTO960
600 IFTP<>148THEN890
605 T=1:GOSUB20
610 IFNP>48279THEN700
620 IFAN=1THENAN=5:NP=PS:GOSUB10:GOTO950
630 IFAN=2THENAN=4:NP=PS:GOSUB10:GOTO950
640 IFAN=8THENAN=6:NP=PS:GOSUB10:GOTO950
700 IFNP<48881THEN750
710 IFAN=5THENAN=1:NP=PS:GOSUB10:GOTO950
720 IFAN=4THENAN=2:NP=PS:GOSUB10:GOTO950
730 IFAN=6THENAN=8:NP=PS:GOSUB10:GOTO950
750 PR=NP-48279
760 IFINT(PR/38)*38+(PR/20)<>PRTHEN800
770 IFAN=3THENAN=7:NP=PS:GOSUB10:GOTO950
780 IFAN=4THENAN=6:NP=PS:GOSUB10:GOTO950
790 IFAN=2THENAN=8:NP=PS:GOSUB10:GOTO950
800 PR=NP-48241
805 IFINT(PR/38)*38+(PR/20)<>PRTHEN950
810 IFAN=7THENAN=3:NP=PS:GOSUB10:GOTO950
820 IFAN=6THENAN=4:NP=PS:GOSUB10:GOTO950
830 IFAN=8THENAN=2:NP=PS:GOSUB10:GOTO950
890 T=4:GOSUB20
900 IFBAL=0THENBAL=1:FL=1:TE=PS:GOSUB12:
GOTO950
910 IFBAL=1ANDTP=96THENBAL=0:GOSUB12
920 IFBAL=1ANDTP=79THENBAL=1:GOSUB12
950 PS=NP:NEXT
955 IFBAL=0THEN970
960 IFFL=1THENFL=0:PS=TE:BAL=0
970 GOTO300
1000 FORU=1TO200:NEXT
1015 CLS
1016 PRINT
1017 PRINTTAB(4)SC;" OUT OF ";NB
1018 FORI=1TO7:PRINT:NEXTI
1019 PRINTTAB(5)"** SCORE **"
1030 PRINT
1031 PRINTTAB(8)INT(100*SC+10*SC*NB/TR)
1040 FORI=1TO4:PRINT:NEXTI
1041 PRINTTAB(4)"ANOTHER GAME ?"
1050 PRINT
1051 PRINTTAB(8)"Y/N"
1060 GETR$:IFR$=""THEN1060
1070 IFR$="Y"THENRUN
1080 IFR$="N"THENEND
1090 GOTO1060
2000 CLS
2010 PRINT
2011 PRINTTAB(3)"** BILLIARDS **"
2012 PRINTTAB(3)"converted from (VIC-20)
 listing"
2013 PRINTTAB(3)"by Robert Dutton"
2020 PRINT
2021 PRINTTAB(9)"USE:Q"
2030 PRINT" 'W'=NORTH  'E'=N.E."
2040 PRINT" 'X'=SOUTH  'C'=S.E."
2050 PRINT" 'D'=EAST   'Z'=S.W."
2060 PRINT" 'A'=WEST   'Q'=N.W."
2070 PRINT
2071 PRINT
2072 PRINTTAB(2)"WITH THE SHIFT KEY"
2080 PRINTTAB(1)"OFF  FOR A SHORT RUN"
2085 PRINTTAB(1)"ON  FOR A LONG RUN"
2090 PRINT"    HOW MANY BALLS ?"
2100 INPUT"(1 TO 10)";NB
2110 NB=ABS(INT(NB)):IFNB<1ORNB>10THENRU
N
2120 RETURN
3010 FORA=1TO50
3015 LETI=INT(RND(1)*100)+1
3020 SOUND1,I,15
3030 NEXTA
3040 ZAP
3045 WAIT100
3050 RETURN
```

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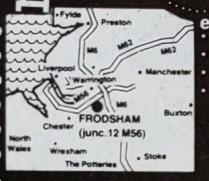

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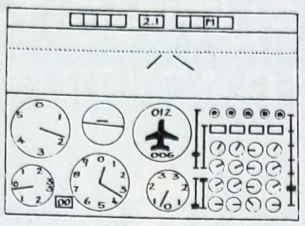

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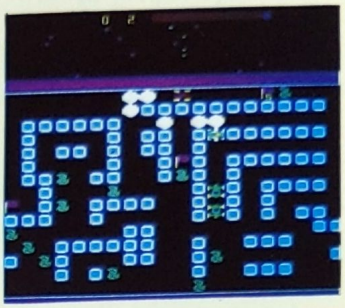

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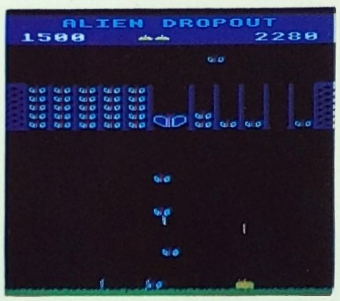

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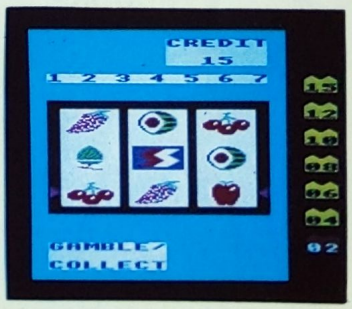

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